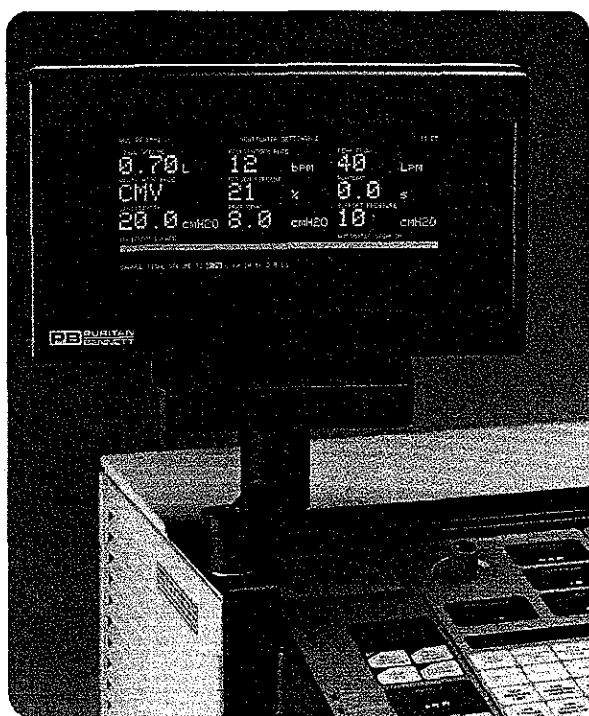


**PB PURITAN
BENNETT®**

7202 Display



Service Manual

PB **PURITAN**
BENNETT

7202
Display

Service Manual

Part Number 22107 B
February 1991

SECTION 1. DESCRIPTION

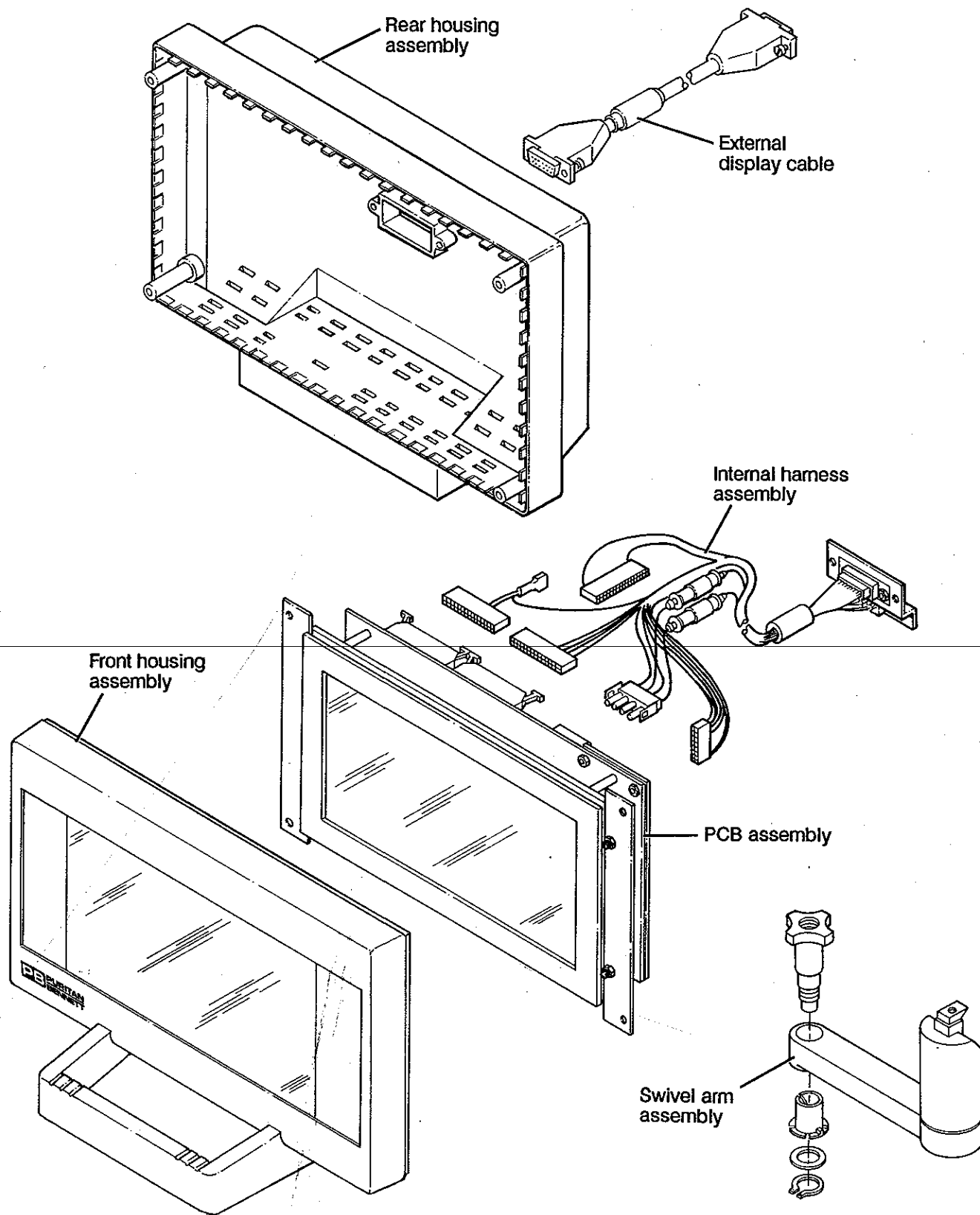
The 7202 Display supplements the 7200® Series Ventilator's message display window by providing:

- An enhanced view of ventilator messages.
- Detailed readouts of patient data, ventilator settings, and status.
- Visibility of ventilator condition messages from a range of angles and distances.

The display uses a series of interactive screens to report on ventilator status and respond to operator actions. The display is installed on a swivel arm assembly that can be adjusted for maximum visibility. The 7202 Display communicates with the 7200 Series Ventilator via a cable that connects to the DISPLAY port on the back panel of the ventilator.

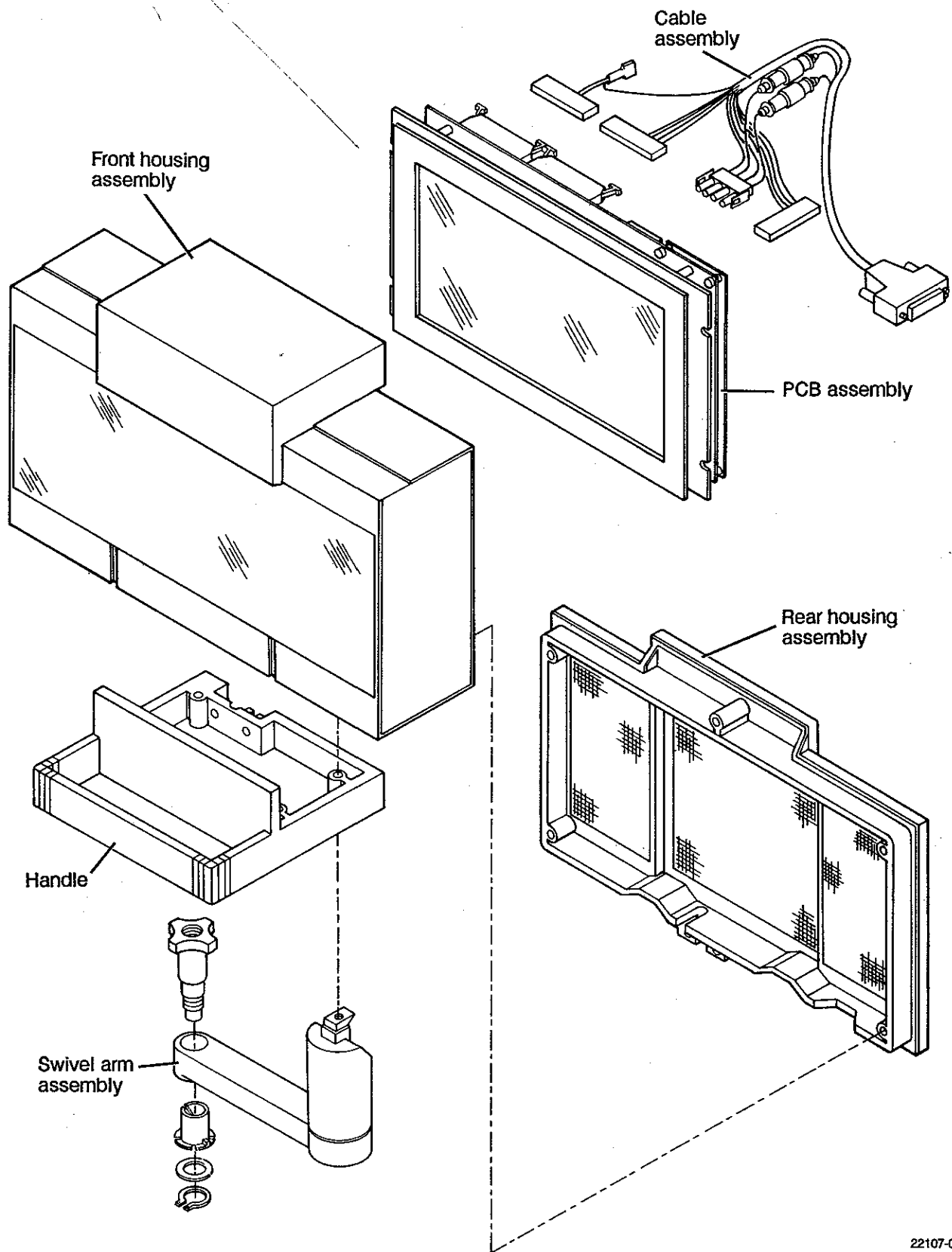
There are two versions of the 7202 Display. The current version was designed for use with the 7200ae or 7200a Ventilator, and includes a rear switch for setting the display to work with either ventilator. An earlier version has no external switch. (The early version can work with the 7200a or 7200ae, but you must set an internal jumper accordingly. Also, to use the 7200ae Graphics option, you must first install a compatibility kit, P/N 4-017180-00, on the display with no external switch.)

Figures 1-1 (for displays with rear switch) and 1-2 (for displays with no external switch) show the major components of the display. Section 2 tells you how to disassemble and assemble each of these components.



22107-001B

Figure 1-1. 7202 Display (Rear Switch)



22107-001A

Figure 1-2. 7202 Display (No External Switch)

1.1 Description

The display's thin-profile screen features high brightness, no distortion or flicker, wide viewing angles, and low power consumption. The all-dot matrix screen allows high-resolution graphics and alphanumeric characters.

1.2 Electronic Circuitry

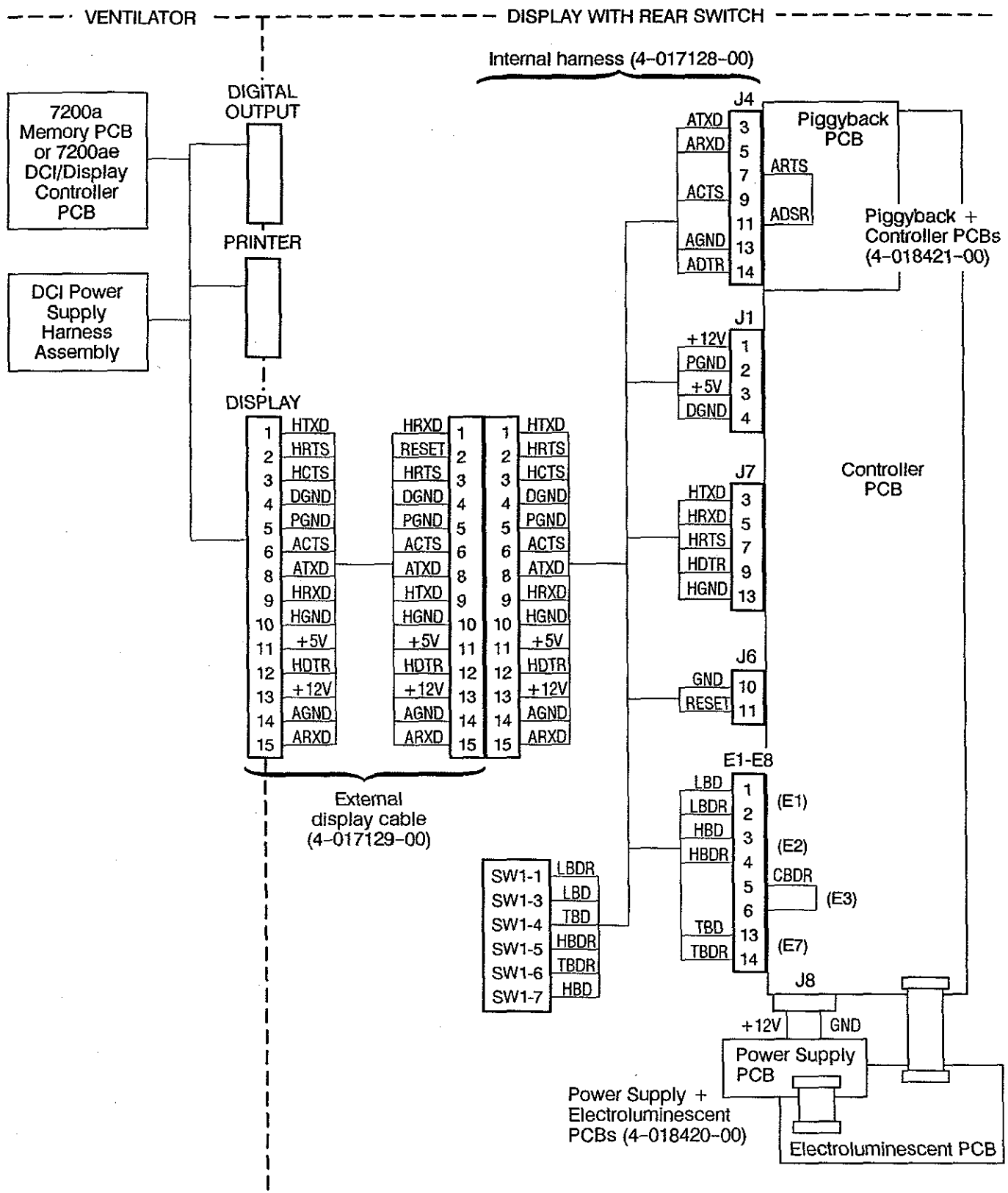
The display's PCB assembly contains the electronic circuitry. The PCB assembly includes four PCBs: controller, piggyback, power supply, and electroluminescent. Figures 1-3 (for the display with the rear switch) and 1-4 (for the display with no external switch) show the interconnection within the PCB assembly, and between the display and the ventilator.

The controller PCB accepts ASCII and hex data from the ventilator and interprets it for display. The appropriate image is stored in RAM on the controller PCB. The controller PCB also drives the display module by sending pixel clock, data, and horizontal and vertical synchronization signals (which determine which pixels are lit) to the electroluminescent PCB.

The electroluminescent PCB includes a circuit board mounted to electroluminescent material. This material is sandwiched between two glass panels. Inside the glass panels are column and row conductors. Which pixels light up is determined by the column and row signals sent by the controller PCB. These signals send voltage across the corresponding column and row conductors inside the glass panels. The electric field that is created between two "intersecting" voltages causes the electroluminescent material to light up.

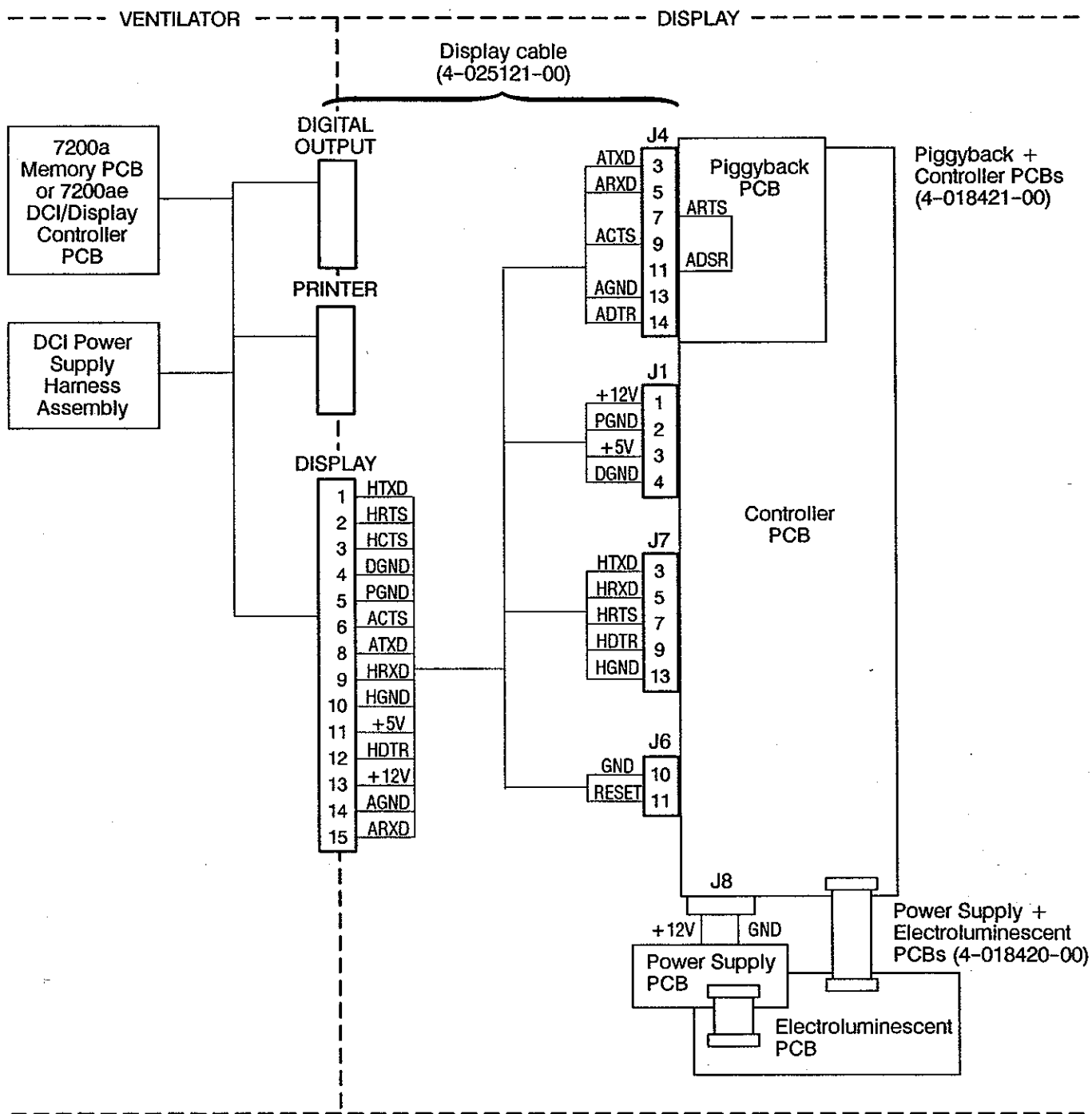
The piggyback PCB adds a second serial port to the PCB assembly. The second serial port allows the display to communicate with the printer.

The power supply PCB converts its 12 V input to the different voltages required by the display circuitry.



E22107-002B

Figure 1-3. 7202 Display (Rear Switch)/7200 Series Ventilator Interconnection Diagram



E22107-003B

Figure 1-4. 7202 Display (No External Switch)/7200 Series Ventilator Interconnection Diagram

1.3 Specifications

Screen

24 line, 80 characters per line
512 x 256 pixel matrix
Pixel size 0.011 inches square
Pixel luminance 25 ft-Lamberts at square
Display color yellow-orange centered at 585 nm

Operating voltages

5 V dc at 1 A and 12 V dc at 0.85 A

Total power consumption

25 W

Display interface

RS-232C serial interface, asynchronous.

Data format (display with rear switch): 19,200 baud, 1 start bit, 8 data bits, 1 stop bit, no parity.

Data format (display with no external switch): 9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity.

Active display area

19.69 cm (7.68 inches) wide, 9.85 cm (3.84 inches) high

Approximate weight

Display with rear switch: 3.2 kg (7 lb)

Display with no external switch: 5 kg (11 lb)

Temperature

Operating: 16 to 41° C (60 to 105° F)

Storage: -34 to 71° C (-30 to 160° F)

Operational testing

A self-test mode (switch-selectable in the rear switch version, and jumper-selectable in the display with no external switch) displays several patterns in a repeating sequence (all input is ignored). Section 3 (Testing and Troubleshooting) tells you how to view the test screens.

SECTION 2. SERVICE

The 7202 Display is a field-serviceable accessory of the 7200 Series Ventilator. This section tells you how to clean, disassemble, and reassemble the display. Section 4 lists the part numbers for the display's field-replaceable units.

2.1 Required Tools

You will need these tools to service the display:

- Small standard screwdriver
- Small phillips screwdriver
- Small nose pliers
- Snap ring pliers
- Hex screwdriver set
- Static-dissipative service kit (P/N 4-018149-00) or equivalent (static-dissipative mat, ground cord, and wrist strap)
- Conductive bags
- Digital multimeter accurate to three decimal places

2.2 Cleaning

Use a damp cloth and mild detergent to clean the display. Take care not to scratch the image area. Dry thoroughly.

CAUTION

To avoid damage to the display, do not autoclave, use a liquid bactericide, scrub with abrasive cleaners, or allow liquid to penetrate the display or ventilator.

2.3 Pre-Service Procedures

CAUTION

Never connect or disconnect the 7202 Display from the ventilator while the ventilator is operating. If the ventilator is not turned off, a momentary loss of power to the pneumatic assembly could result, and could start back up ventilation (BUV) mode or damage the display.

1. Run Total EST on the 7200 Series Ventilator. Performing TEST is recommended so if TEST fails after the display is reinstalled, the source of the problem can be easily identified and corrected.
2. Turn off the ventilator. Detach the display cable from the DISPLAY port on the back of the ventilator.

3. Unscrew the display knob and remove the display from the ventilator. Place the display face down on a flat surface for disassembly/assembly. Take care not to scratch the image area.

CAUTION

To protect electrostatic-sensitive equipment, service personnel must use a static-dissipative service kit and must follow all electrostatic discharge (ESD) procedures and precautions before servicing the display.

2.4 Rear Housing

This section tells you how to remove and replace the rear housing.

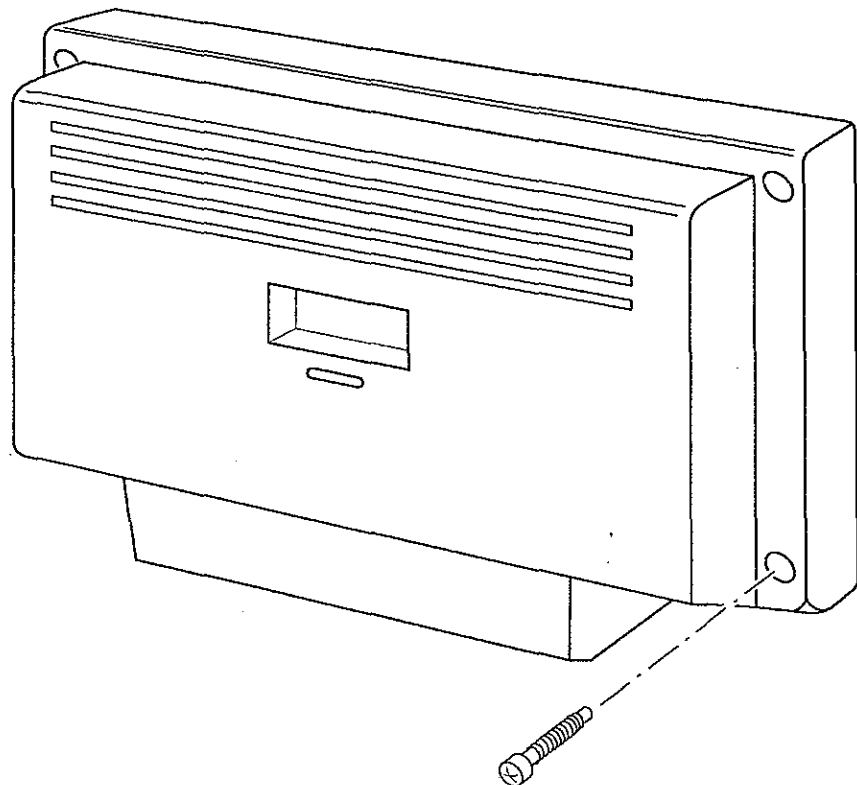
2.4.1 Removing the Housing

CAUTION

To prevent unnecessary PCB repair, do not pull on the display cable with excessive force. Do not pry the rear housing open with a screwdriver or any other instrument.

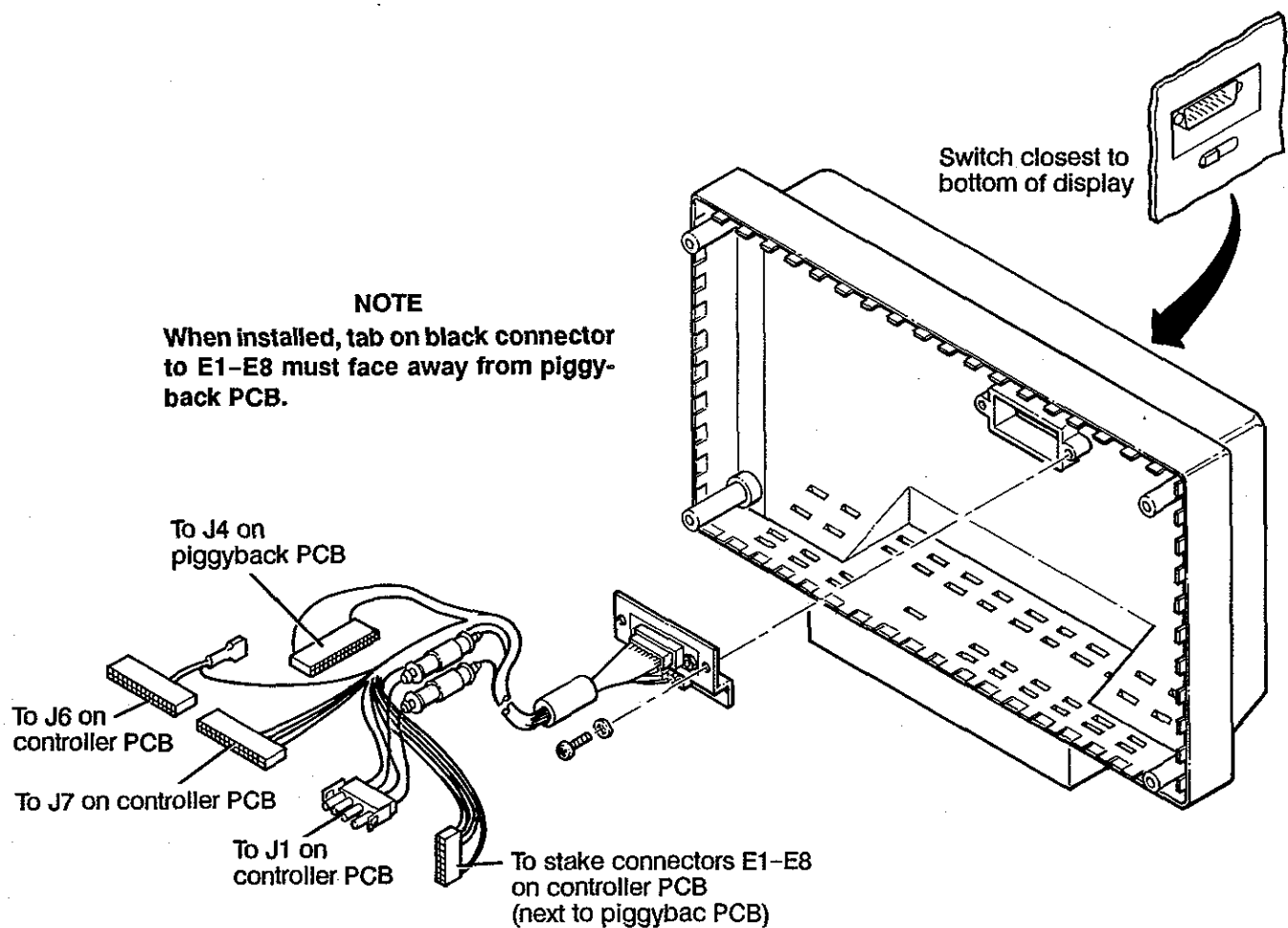
For displays with rear switch:

1. Remove the external display cable from the rear of the display.
2. Remove the four screws and washers from the rear housing (see Figure 2-1).
3. Separate the front housing from the rear housing by pulling on the front handle. If the front and rear housings don't come apart readily, try pulling gently on the corners of the housing first.
4. Remove the internal harness assembly from the rear housing (see Figure 2-2). Remove the rear housing and set aside.



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Figure 2-1. Removing/Replacing the Rear Housing (Displays with Rear Switch)

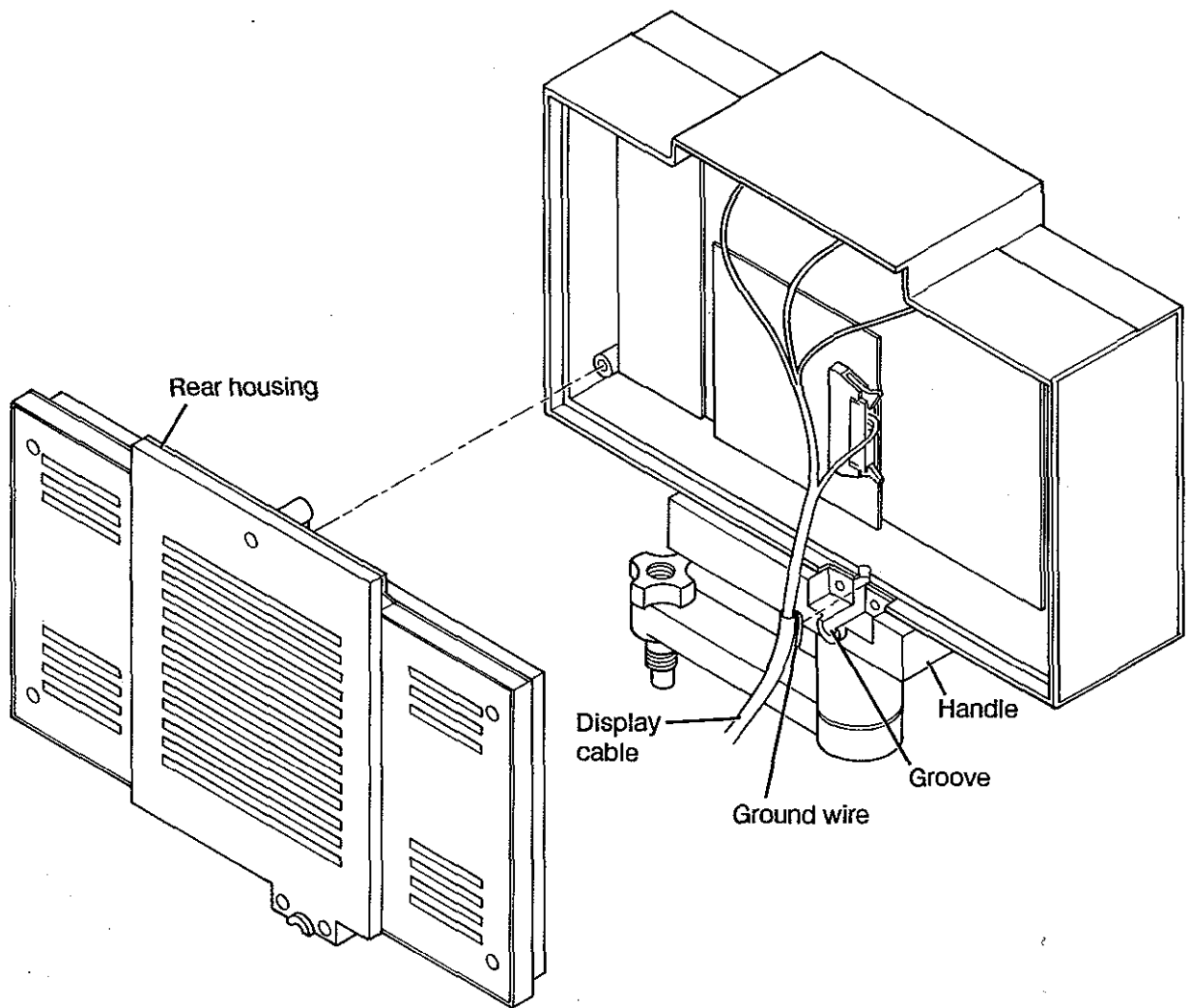


22107-005B

Figure 2-2. Removing/Replacing the Internal Harness from the Rear Housing (Displays with Rear Switch)

For displays with no external switch:

1. Remove the seven screws from the rear housing (see Figure 2-3).
2. Separate the rear housing from the front housing by pulling up gently on the display cable. Remove the rear housing and set aside.



22107-003A

Figure 2-3. Removing/Replacing the Rear Housing (No External Switch)

2.4.2 Replacing the Rear Housing

For displays with rear switch:

1. Once the internal harness assembly is attached to the PCB connectors, reconnect the other end of the harness to the rear housing (see Figure 2-2).
2. Set the front housing flat on a surface that won't scratch the window (this is easiest to do with the handle hanging off the edge of the surface).
3. Make sure that the gasket is firmly seated in the recess around the edge of the rear housing. To attach the front and rear housings, it is easiest to "fold" the internal harness between the two fuses, then press the housings together (make sure that the harness is not "pinched" by the housings).
4. Use a thin screwdriver to align the screw holes in the new rear housing, the brackets, and the front housing. Reinstall the four screws and washers into the rear housing.

For displays with no external switch:

1. Once the display cable is attached to the PCB connectors, position the ground wire (the bare silver filaments on the display cable) against the groove in the handle (see Figure 2-3).
2. Reinstall the rear housing, pressing it down until it seats firmly in the front housing.
3. Replace the seven screws in the rear housing and tighten until snug.

2.5 Printed Circuit Board (PCB) Assembly

This section tells you how to disassemble and reassemble the PCB assembly. The PCB assembly includes two ribbon cables and four PCBs (controller, piggyback, power supply, and electroluminescent).

2.5.1 Disassembly

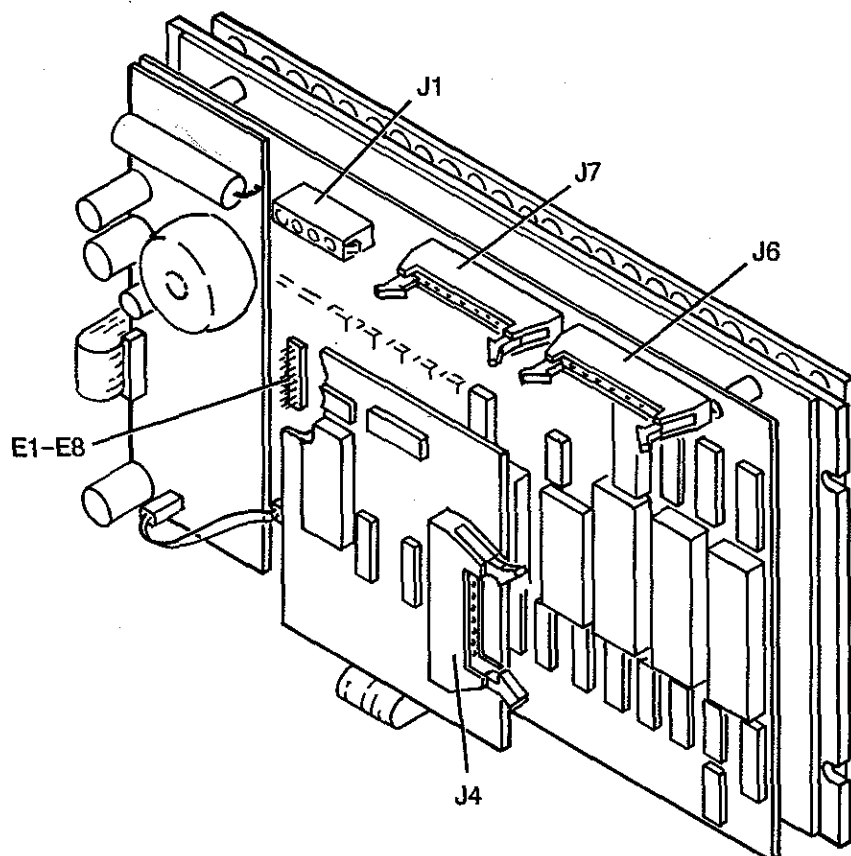
WARNING

To prevent electrical shock or damage to the display PCB assembly, disconnect the display from the ventilator (when the ventilator is turned off) and allow the unit to sit for two minutes to allow the capacitors to discharge before servicing the PCB assembly.

CAUTION

Follow these precautions when handling PCBs: Do not touch PCB connector ends. Acids on fingers can cause corrosion and subsequent equipment malfunction. When removing any of the PCBs, use a properly grounded mat and wrist strap. Store PCBs in conductive bags to protect them.

1. Remove the rear housing (see Section 2.4.1).
2. Label and disconnect the cable from connectors J1, J4, J6, and J7 on the PCB assembly (Figure 2-4).
For displays with rear switch: Also label and disconnect cable from the E1-E8 jumper block.
3. For displays with no external switch: Remove the four screws that hold the PCB assembly to the front housing.
4. Lift the PCB assembly out of the front housing and place on a static-dissipative mat.



22107-006B

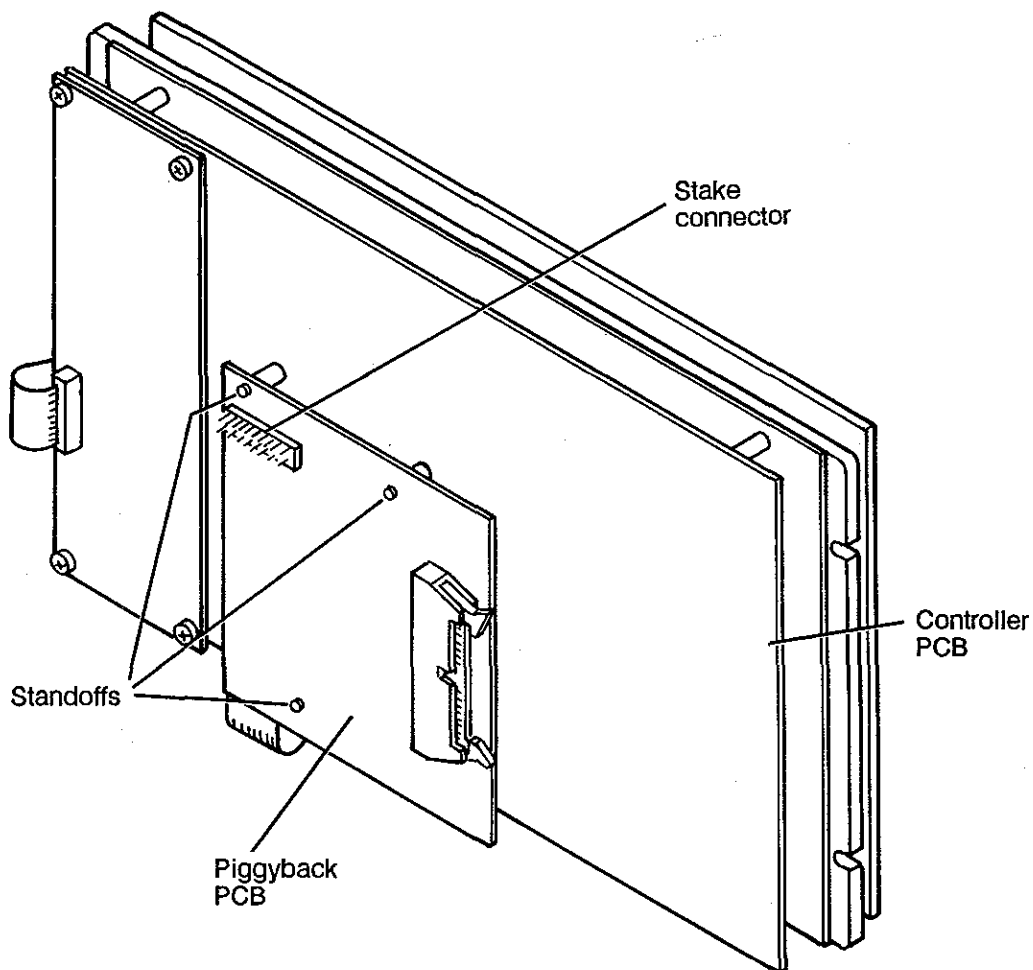
Figure 2-4. PCB Assembly

Piggyback PCB

Remove the piggyback PCB from the controller PCB by squeezing the tops of the three stand-offs with pliers and lifting up on the piggyback PCB (see Figure 2-5). Pull the PCB straight up so that the stake connector pins underneath the PCB don't bend. Place the piggyback PCB in a conductive bag and set aside.

NOTE

If you replace the controller or piggyback PCBs (the two PCBs are a matched set), be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.



22107-005A

Figure 2-5. Piggyback PCB

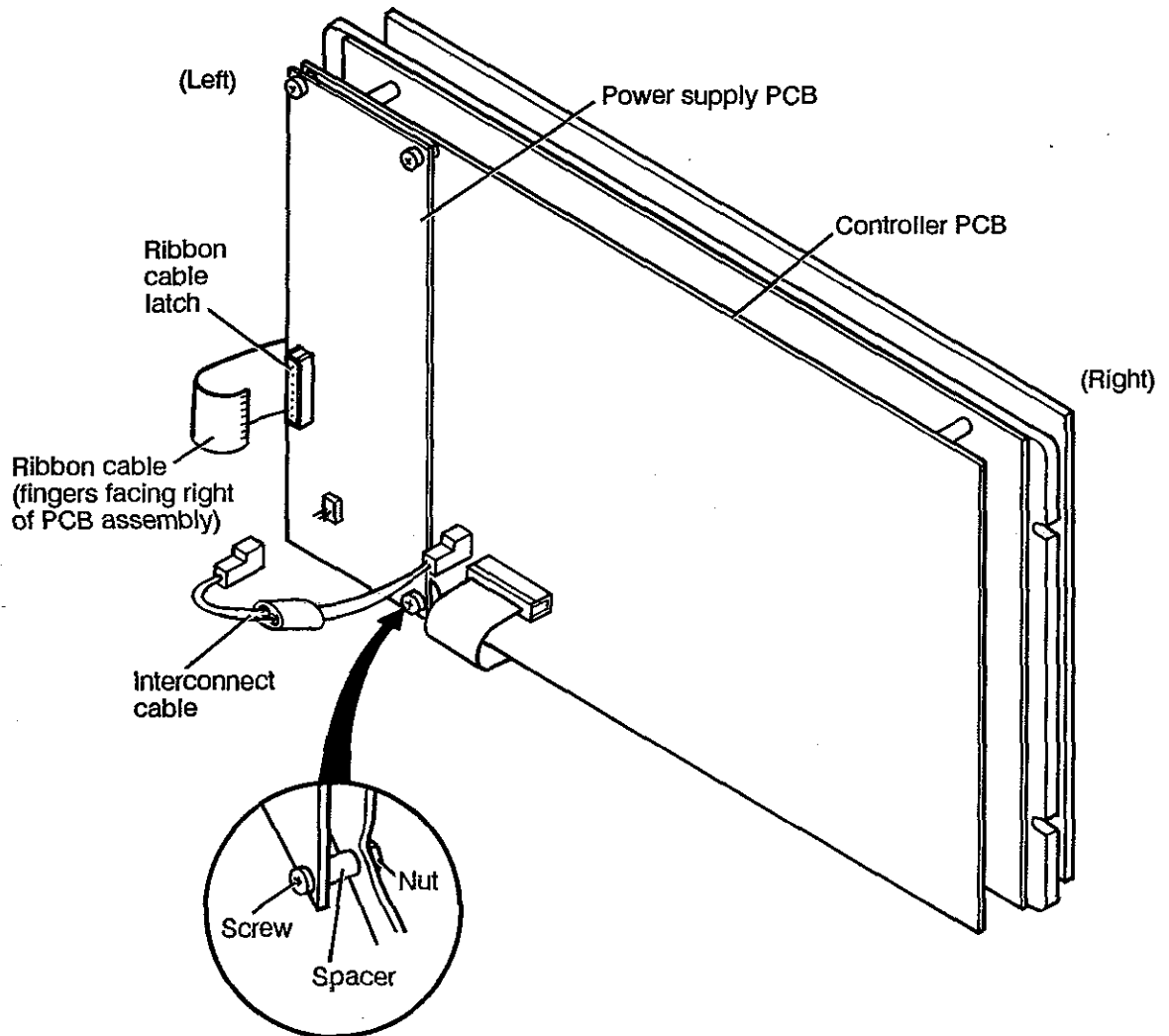
Power Supply PCB

Refer to Figure 2-6.

1. Remove the interconnect cable.
2. Remove the ribbon cable: Gently lift up on the sides of the ribbon cable latch with your hand or a standard screwdriver. Pull the ribbon cable straight out.
3. Remove the four screws, four spacers, and four nuts that hold the power supply PCB to the controller PCB and set aside. Place the power supply PCB in a conductive bag and set aside.

NOTE

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.



22107-006A

Figure 2-6. Power Supply PCB

Controller PCB

1. Remove the ribbon cable: Gently lift up on the sides of the ribbon cable latch with your hand or a standard screwdriver. Pull the ribbon cable straight out (see Figure 2-7).
2. Remove the interconnect cable from the controller PCB and set aside.
3. Remove the four screws and spacers that secure the controller PCB to the electroluminescent PCB.
4. Lift the controller PCB off the electroluminescent PCB.

NOTE

If you replace the controller or piggyback PCBs (the two PCBs are a matched set), be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

5. Place the controller PCB in a conductive bag and set aside.

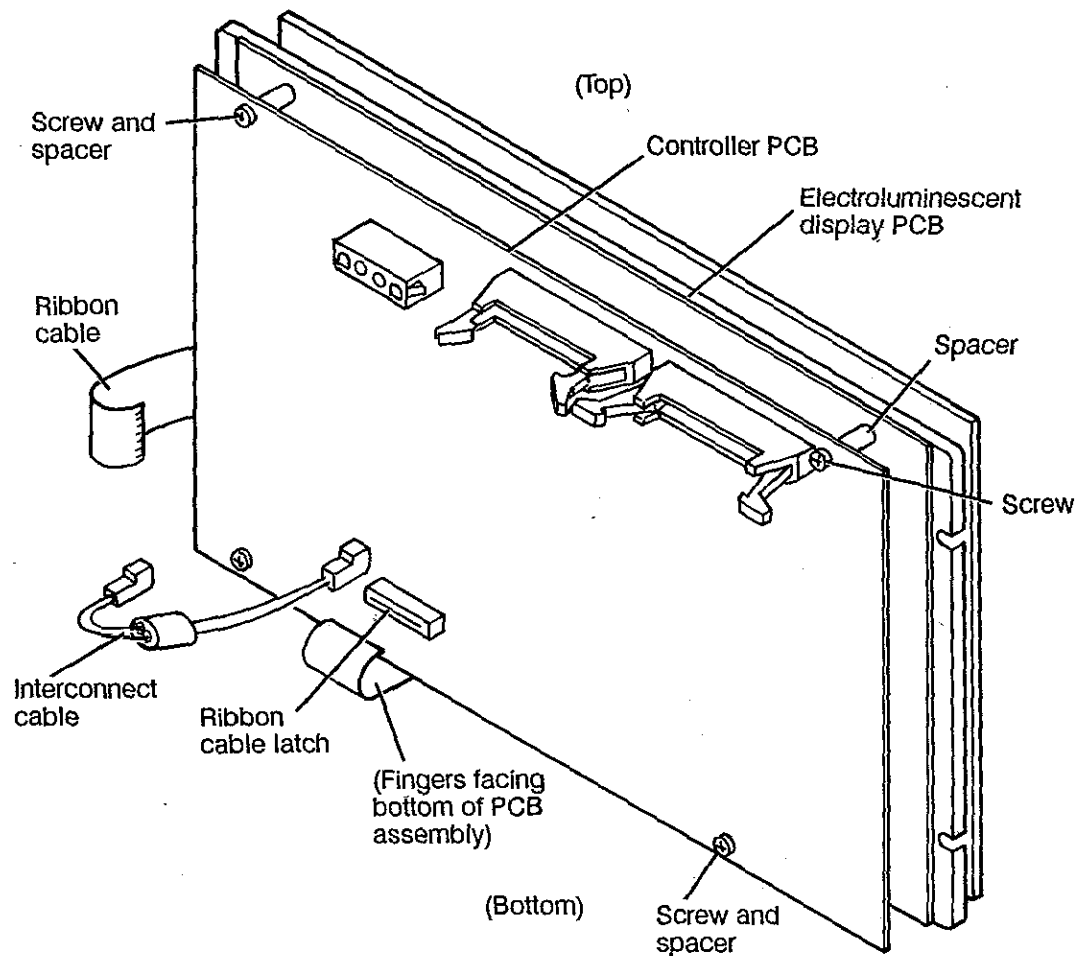


Figure 2-7. Controller PCB

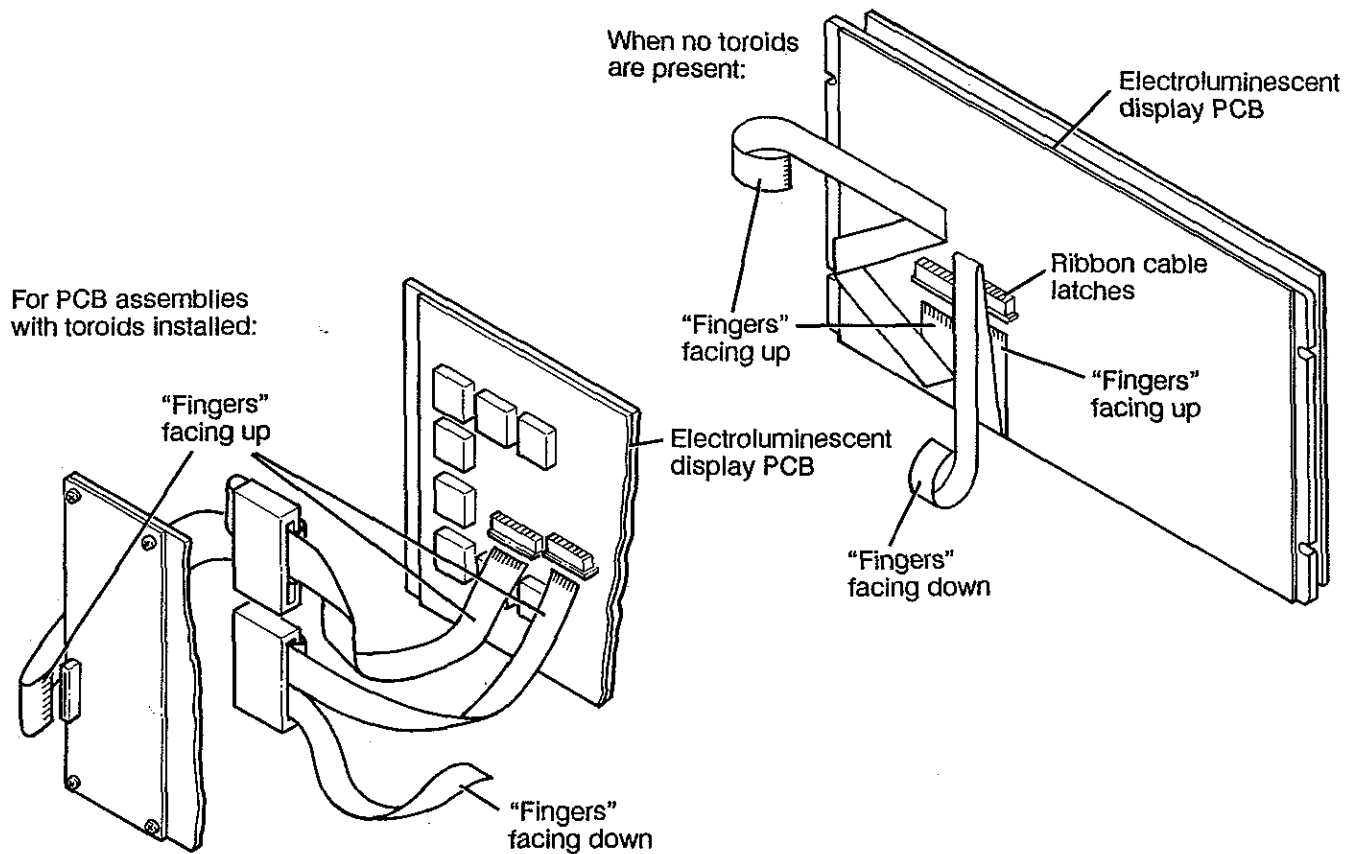
Electroluminescent PCB

Follow these steps to remove the brackets and two ribbon cables connected to the electroluminescent PCB. (The brackets are installed only on displays with the rear switch.)

1. Lift the cable latches (see Figure 2-8). You can do this by hand, or you can insert the tip of a screwdriver into the slot on the ribbon cable latches, then twist the screwdriver to lift each of the latches.
2. Pull each of the ribbon cables straight out from its latch.
3. For displays with rear switches: Remove the four screws and lockwashers that hold the two brackets to either side of the electroluminescent PCB.

NOTE

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.



22107-007B

Figure 2-8. Electroluminescent PCB with Ribbon Cable Connections

2.5.2 Reassembly

Electroluminescent PCB

NOTE

Ribbon cables will make contact in only one direction. When positioning the ribbon cables in the connectors on the electroluminescent PCB, ensure that the connective "fingers" are facing up and are securely positioned in the latches. (See Figure 2-8.)

1. Fold the ribbon cables (see Figure 2-8). This allows each end of the ribbon cables to reach its latch.
2. With the connective fingers facing up, insert the ends of the ribbon cables into the ribbon cable latches on the electroluminescent PCB. Press the latches down to snap the cables into place. Gently tug on the ribbon cables to make sure that they don't pull loose from their connectors.
3. For displays with rear switch: Position the two brackets (pern nuts facing down) on either side of the electroluminescent PCB, between the PCB and the display screen. Make sure that the brackets are positioned directly against the electroluminescent PCB. Use the four screws and lockwashers to attach the brackets.

Controller PCB

1. Thread the ribbon cables through the toroids on the underside of the controller PCB.
2. Position the four long spacers on the electroluminescent PCB (see Figure 2-7).
3. Place the controller PCB on the spacers, aligning the holes.
4. Insert the four long screws into the holes.

NOTE

Check for correct alignment between the electroluminescent PCB, spacers, and controller PCB before tightening the screws.

5. Tighten the screws until snug.
6. Insert the ribbon cable into the cable connector on the controller PCB (see Figure 2-7). Ensure that the ribbon cable fingers face the bottom of the PCB assembly as you insert the cable into its latch.

NOTE

Ribbon cables will make contact in only one direction. When positioning the ribbon cable in the connector on the controller PCB, ensure that the connective fingers are facing the bottom of the PCB assembly and are securely positioned in the latch.

7. Seat the ribbon cable securely and press down on the latch to close. Gently tug on the cable to make sure that it doesn't pull loose from its connector.

Power Supply PCB

Follow these steps to reinstall the power supply PCB to the controller PCB.

1. Position the four spacers over the four holes on the controller PCB (see Figure 2-6).
2. Place the power supply PCB over the spacers.
3. Check the alignment of the PCB holes and spacers, then place the screws in the power supply PCB holes, spacers, and controller PCB holes.
4. From underneath the controller PCB, install a nut onto the end of each of the four screws. You may find this easiest to do by using pliers to hold the nut, while using a phillips screwdriver to tighten the screw.
5. Insert the ribbon cable into the latch on the power supply PCB (see Figure 2-6). Ensure that the ribbon cable fingers face your right as you insert the cable into its latch. Press the ribbon cable latch into place. Gently tug on the ribbon cable to make sure that it does not pull loose from its connector.

NOTE

Ribbon cables will make contact in only one direction. Ensure that the connective fingers are facing your right (see Figure 2-6) and securely positioned in the latches on the electroluminescent PCB.

6. Reinstall the interconnect cable between the controller PCB and the power supply PCB.

Piggyback PCB

Refer to Figure 2-5. Align the piggyback PCB with the three standoffs. Carefully align the stake connector pins of the piggyback PCB with the connector sockets on the controller PCB. (Be careful not to bend any of the stake connector pins. If any of the pins do bend, carefully bend them back to their correct positions.) Press down until the board snaps into place.

PCB Assembly

1. Reconnect the internal harness (for displays with rear switch), or the display cable (for displays with no external switch). See Figure 2-2.
2. Replace the PCB assembly in the front housing with cable connectors closest to the top of the front housing.
3. For displays with no external switch: Insert the four screws that hold the assembly to the front housing and tighten until snug.
4. Replace the rear housing (see Section 2.4.2).

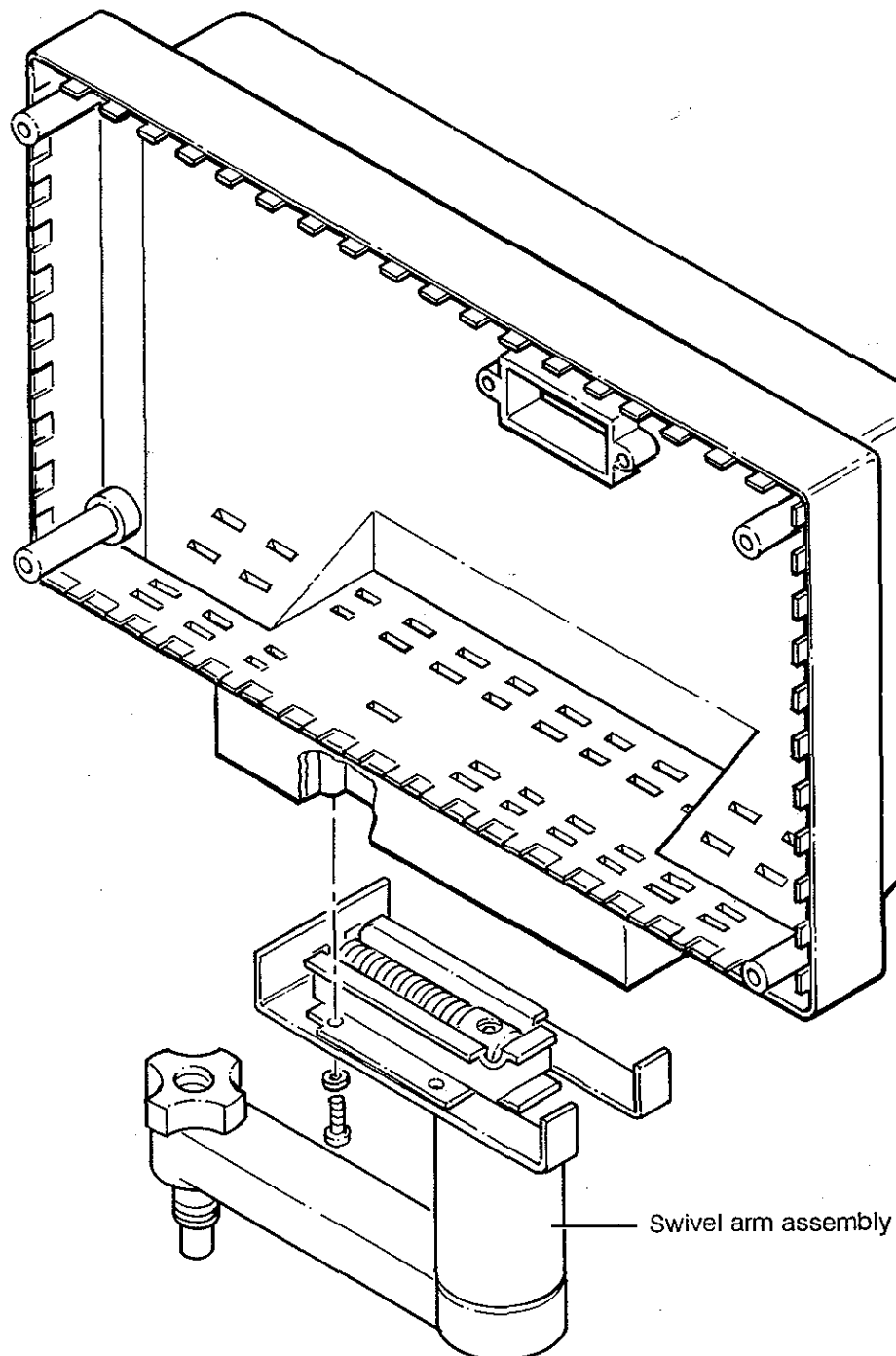
2.6 Swivel Arm Assembly

This section tells you how to disassemble and reassemble the swivel arm assembly (see Figure 2-9).

2.6.1 Disassembly

For displays with rear switch:

1. Remove the four screws that hold the swivel arm assembly to the rear housing (see Figure 2-9).
2. Separate the bottom plate and swivel arm assembly from the rear housing.

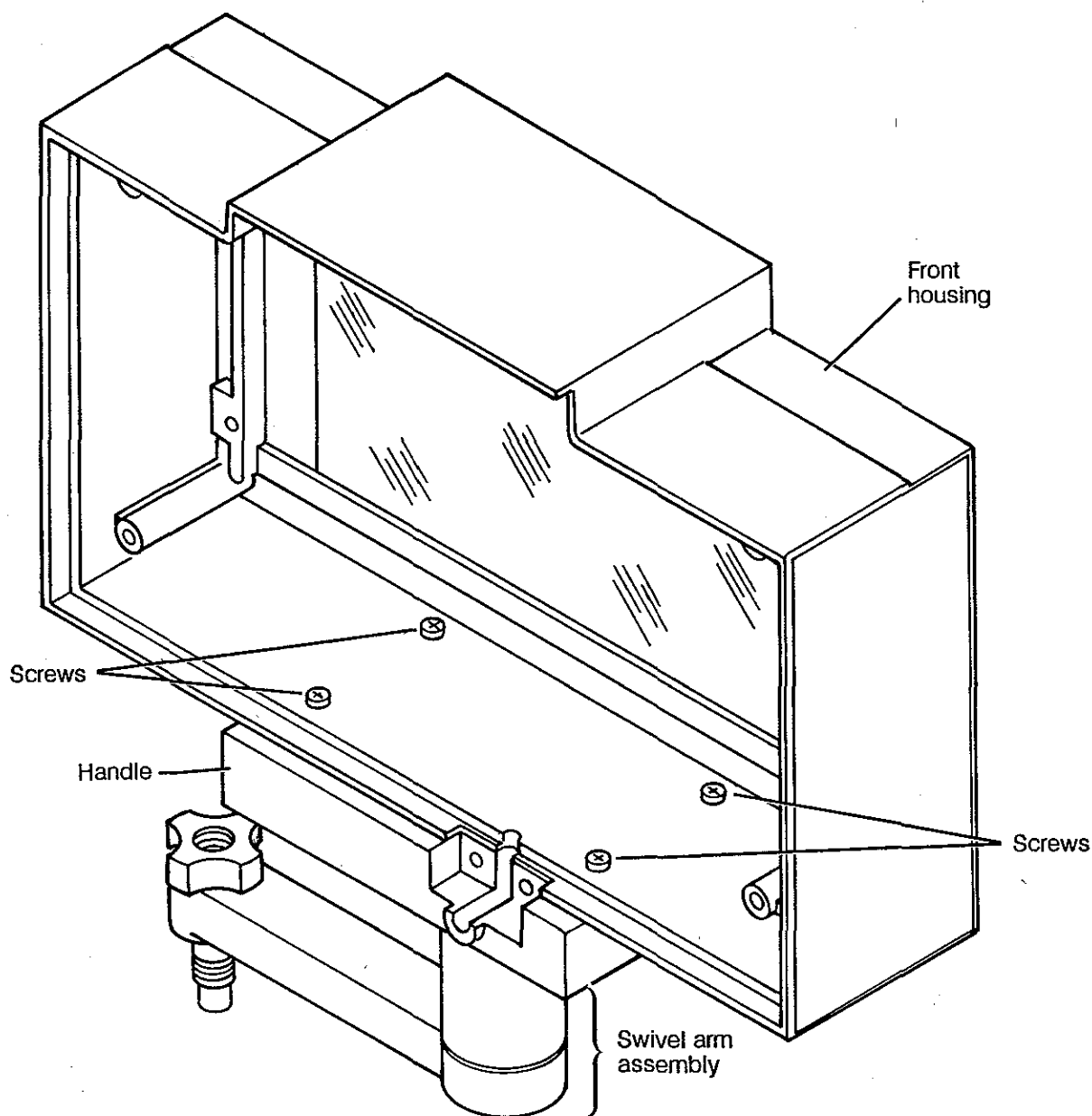


22107-008B

Figure 2-9. Swivel Arm Assembly (Displays with Rear Switch)

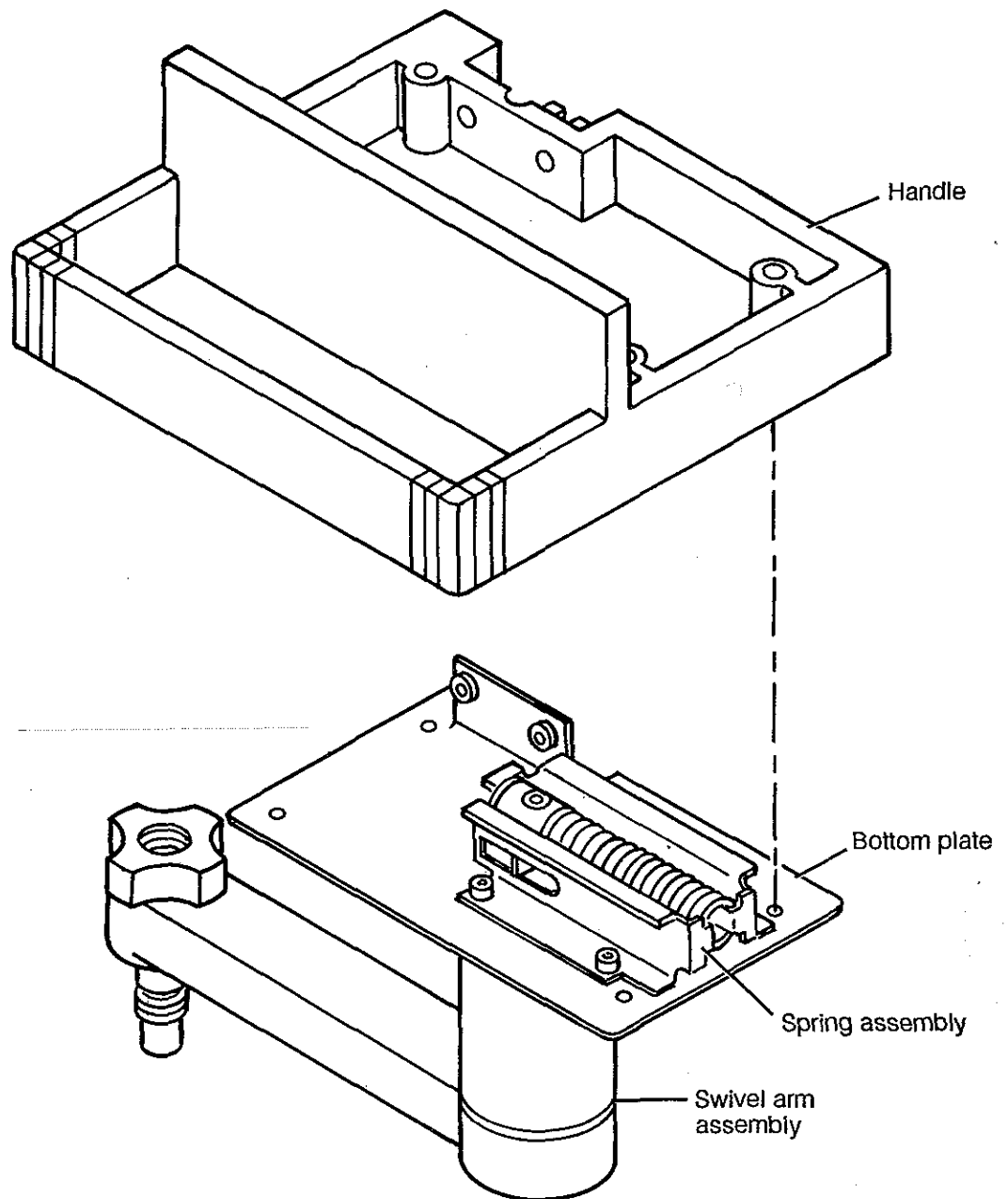
For displays with no external switch:

1. Remove the rear housing as described in Section 2.4.1, and the PCB assembly from the front housing as described in Section 2.5.1.
2. From inside the front housing, remove the four screws holding the handle and swivel arm assembly to the front housing (see Figure 2-10).
3. Separate the handle from the swivel arm assembly by grasping the handle in one hand, the swivel arm assembly in the other. Pull the two sections apart (see Figure 2-11).



22107-009A

Figure 2-10. Swivel Arm Assembly (For Displays with No External Switch)



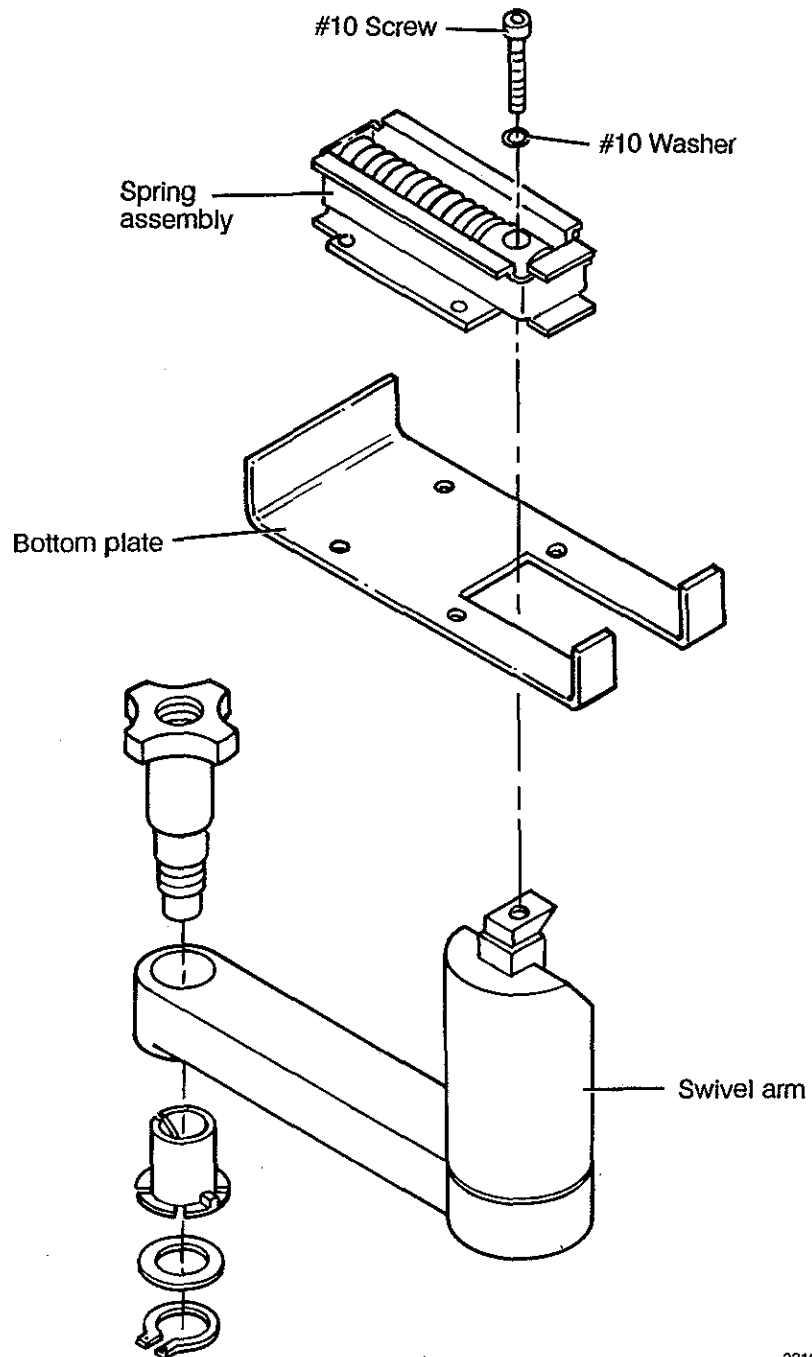
22107-010A

Figure 2-11. Handle and Swivel Arm Assembly (For Displays with No External Switch)

The swivel arm assembly includes the swivel arm, knob, sleeve, washer, and retaining ring. The following are available separately: knob, sleeve, washer, and retaining ring. The handle (for displays with no external switch only) and spring assembly are also available separately. The swivel arm alone is not available separately.

Removing the Spring Assembly and Bottom Plate (Displays with Rear Switch)

1. Remove the #10 screw and washer from the spring assembly (see Figure 2-12).
2. Separate the swivel arm assembly from the spring assembly and bottom plate.
3. Examine parts for wear or damage and replace as needed.

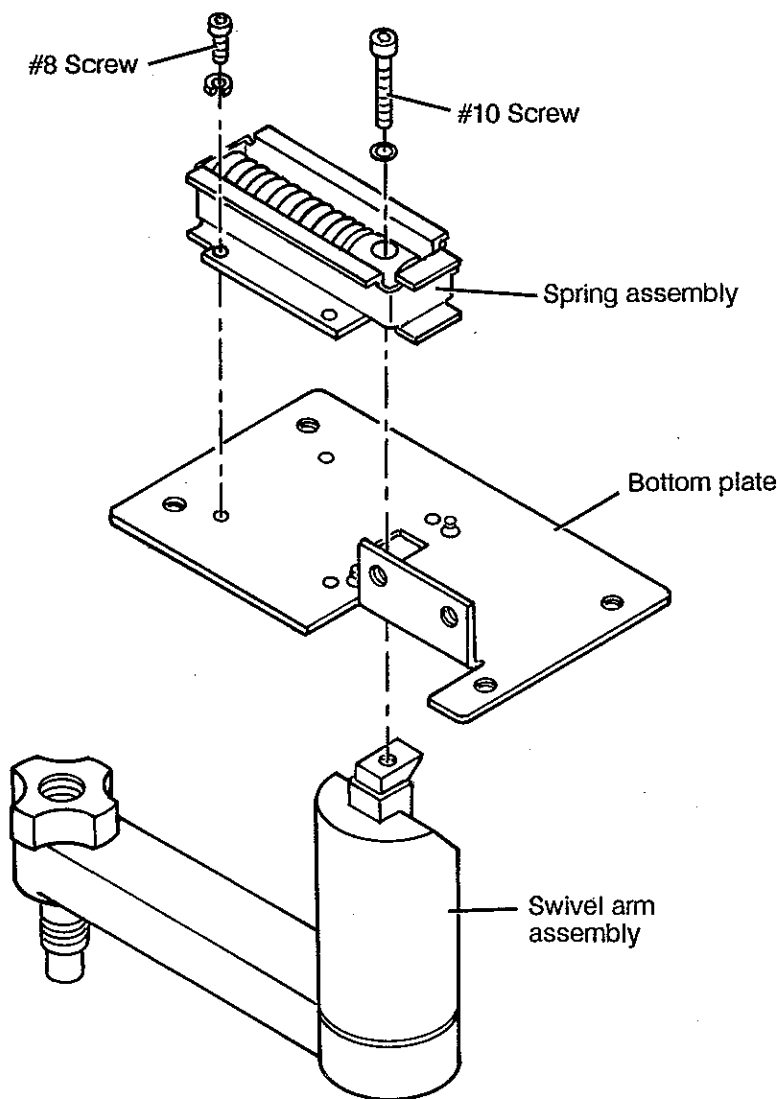


22107-009B

Figure 2-12. Bottom Plate, Spring Assembly, and Swivel Arm Assembly
(Displays with Rear Switch)

Removing the Spring Assembly and Bottom Plate (Displays with No External Switch)

1. Remove the #10 screw and washer from the spring assembly (see Figure 2-13).
2. Separate the swivel arm assembly from the spring assembly and bottom plate.
3. Remove the four #8 screws and washers that attach the spring assembly to the bottom plate.
4. Remove the spring assembly.
5. Examine parts for wear or damage and replace as needed.



22107-011A

Figure 2-13. Bottom Plate, Spring Assembly, and Swivel Arm Assembly
(Displays with No External Switch)

Disassembling the Swivel Arm Assembly

Follow these steps to disassemble the swivel arm assembly:

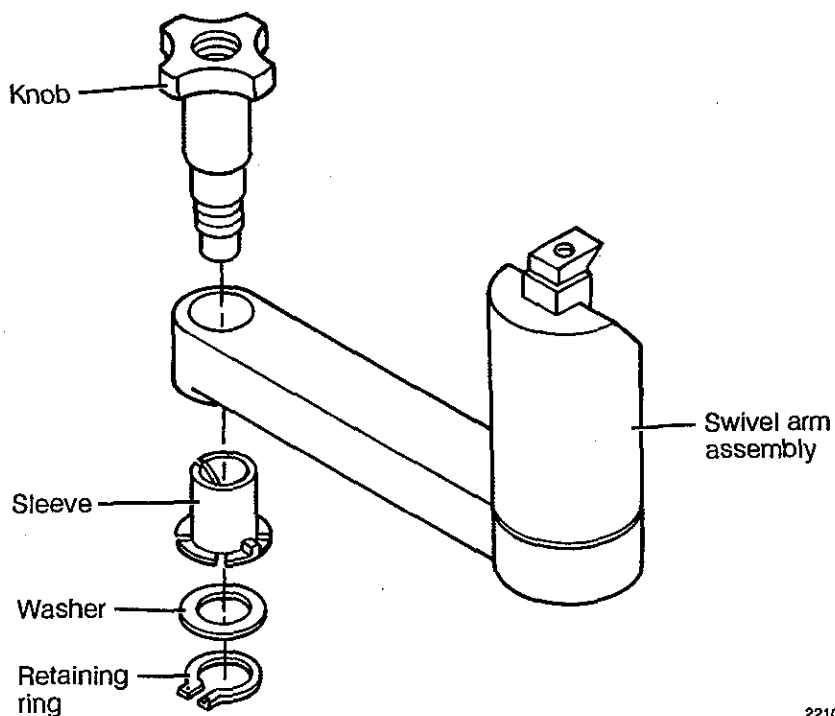
1. Use snap-ring pliers to open and remove the retaining ring.
2. Remove the washer.
3. Pull out the knob.
4. Pull out the sleeve.
5. Examine parts for wear or damage, and replace as needed.

2.6.2

Reassembly

Attaching the Knob

1. From underneath the swivel arm, slide the sleeve into the hole (see Figure 2-14).
2. Insert knob into the top of the hole.
3. Slide washer onto knob.
4. Use snap-ring pliers to replace retaining ring.



22107-012A

Figure 2-14. Swivel Arm Assembly

Attaching the Bottom Plate and Spring Assembly

Displays with Rear Switch:

1. Fasten the spring assembly to the swivel arm assembly with a screw and washer (see Figure 2-13).
2. Position the spring assembly (with swivel arm assembly attached) and bottom plate under the rear housing. Secure the spring assembly to the rear housing with screws and washers.

NOTE

Position the swivel arm assembly and bottom plate so that the bevel faces the back of the display.

Displays with No External Switch:

1. Position the spring assembly over the bottom plate (see Figure 2-12). Use a 9/64-inch hex screwdriver to secure the spring assembly to the bottom plate with screws and washers.
2. Insert the swivel arm assembly into the bottom plate so that the bevel faces the back of the display.
3. Fasten the spring assembly, bottom plate, and swivel arm with a #10 screw and washer.

Attaching the Handle (Displays with No External Switch)

1. Align handle and swivel arm assembly (see Figure 2-10), and press together.
2. Align handle and swivel arm assembly with front housing (see Figure 2-9). Tighten the four screws to secure the swivel arm assembly to the front housing.

Reassembling the Display

1. Place the PCB assembly in the front housing and reinstall as described in Section 2.5.2.
2. Replace the rear housing as described in Section 2.4.2.

SECTION 3. TESTING AND TROUBLESHOOTING

This section tells you what to do in case the 7202 Display has any of the following problems:

- Cursor does not appear on display screen when unit is turned on (Section 3.1).
- Ventilator does not communicate with display, but works properly with another display or printer (Section 3.2).
- Ventilator works properly with the display, but not with a printer (Section 3.3).
- Screen shows all data on one line (Section 3.4).
- Screen display is otherwise flawed (Section 3.5).
- Cursor appears on the screen, but the ventilator cannot communicate with the display (Section 3.6).
- Screen is delaminating (Section 3.7).

This section also describes performance testing for the display (Section 3.8).

CAUTION

Observe these precautions when handling PCBs in any of the following procedures: Do not touch PCB connector ends. Acids on fingers can cause corrosion and subsequent ventilator malfunction. When removing any of the PCBs, use a properly grounded mat and wrist strap. Store PCBs in conductive bags to protect them.

NOTE

When replacing PCBs, always ensure that the ribbon cables are completely inserted into their connectors, and that they are facing in the proper direction. Ribbon cables will make contact in only one direction.

3.1 No Cursor

If no cursor appears on the display, perform the steps described in this section in order.

CAUTION

Turn the ventilator off before disconnecting or connecting the display. If the ventilator is not turned off, a momentary loss of power could initiate back up ventilation (BUV) mode or damage the display.

3.1.1 Check Ventilator Configuration

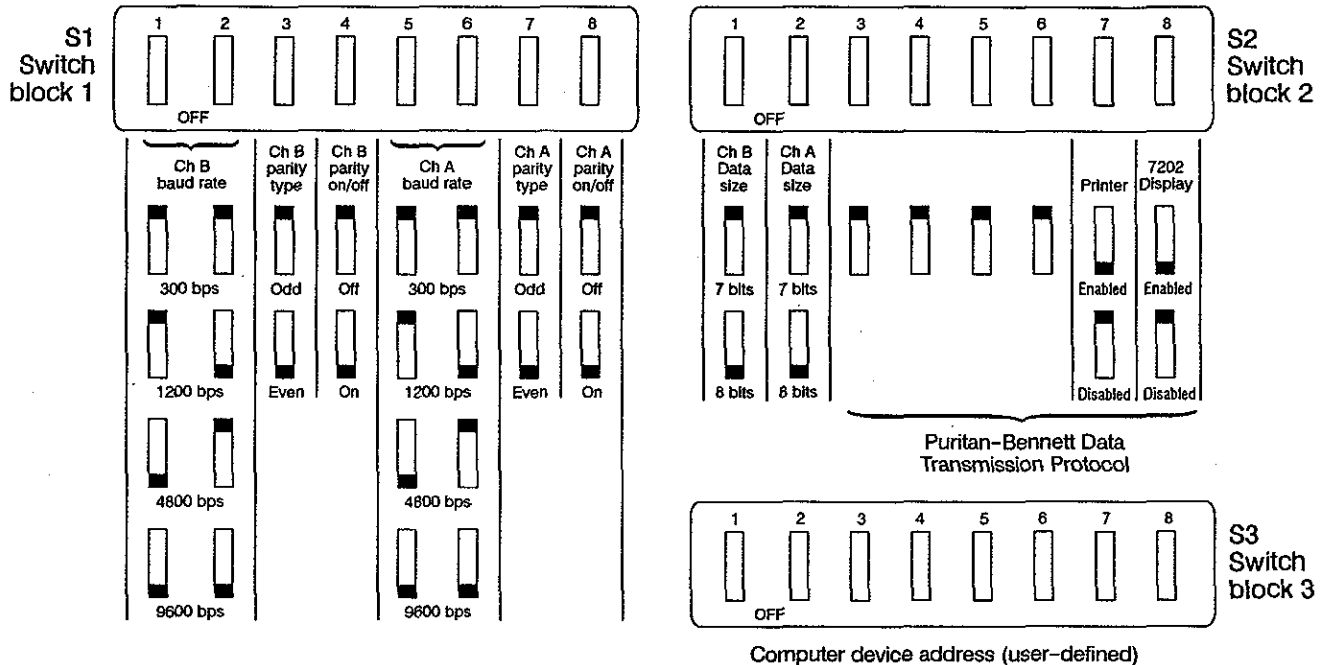
When you initially install the display, your Puritan-Bennett sales representative should ensure that your ventilator is equipped with the correct hardware and software. If you attempt to install the display in a ventilator that is not properly equipped, you must upgrade that ventilator. The ventilator must be a 7200a or 7200ae with a DISPLAY port, and must be configured according to what devices are attached to the ventilator.

To check the ventilator switch settings:

1. Turn the ventilator off.
2. Remove the ventilator top panels.
3. Set switches S1, S2, and S3 on the memory PCB (7200a) or the DCI/display controller PCB (7200ae). You can set the switches whether or not the PCB is installed in the card cage.

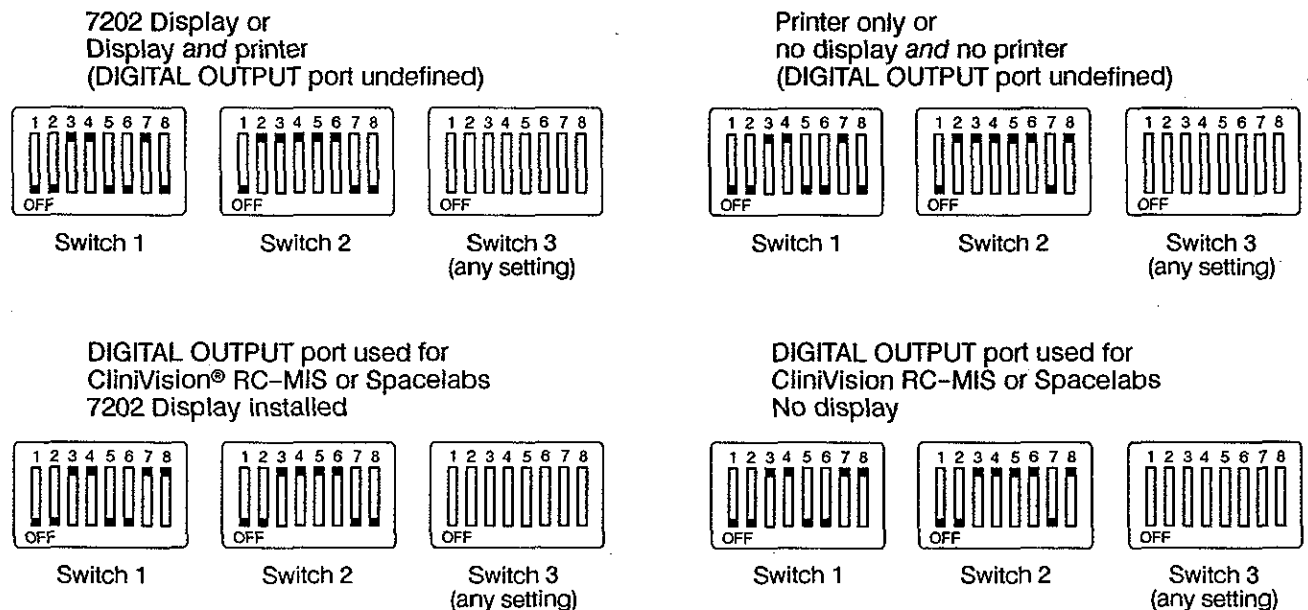
Figure 3-1 summarizes the switch settings. Figure 3-2 shows some of the most common switch settings.

Channel A = Digital output
Channel B = Printer



E22107-0108

Figure 3-1. Switch Settings: Memory PCB (7200a) or DCI/Display Controller PCB (7200ae)



E22107-011B

Figure 3-2. Common Switch Settings: Memory PCB (7200a) DCI/Display Controller PCB (7200ae)

3.1.2 Check that DISPLAY Port Is Functioning

Use an operational display or a printer (either a Puritan-Bennett 7201 or a Hewlett-Packard ThinkJet) with a printer jumper plug (P/N 4-018143-00) installed in the DISPLAY port to verify that the DISPLAY port on the ventilator is working properly. (The jumper plug is required only for 7200a Ventilators with just a printer — no display — installed. The jumper plug is not necessary for the 7200ae Ventilator.)

3.1.3 Check DCI Port Configurations

Follow these steps to check the configuration of the PRINTER and DIGITAL OUTPUT ports using the Digital Communications Interface (DCI) option. Checking the configuration of those ports also tells you whether the DISPLAY port is set up correctly.

NOTE

If your ventilator is not equipped with DCI, you can open your ventilator and check the memory PCB (7200a) or DCI/display controller PCB (7200ae) switch settings shown in Figures 3-1 and 3-2. Go to step 5 of this procedure.

1. Press the < ++ > key until "22" (function 22, communications control) is displayed.
2. Press < ENTER > until the PRINTER configuration is shown in the message display window. The proper configuration is:

PRNTR 96 OD 8 x xxx or PRNTR 96 ED 8 x xxx

3. Press < ENTER > until the COMPUTER (DIGITAL OUTPUT) configuration is shown in the message display window. The protocol number — underlined here — must be an odd number:

CMPTR xx xx x x x xxx

↑ This must be an odd number

4. If the printer and computer configurations are *correct*, go to section 3.1.2.
If either configuration is *incorrect*, proceed to the next step to check the ventilator memory PCB switch settings.
5. Disconnect the ventilator's power and pneumatic sources. Remove the top panels so you can access the card cage.
6. Check that memory PCB (7200a) or DCI/display controller PCB (7200ae) switches are set as shown in Figure 3-1.
7. Reinstall the top panels to the ventilator. Reconnect the ventilator power and pneumatic sources.
8. Turn on the ventilator and recheck the PRNTR and CMPTR configuration (see steps 1 through 4 of this procedure).

3.1.4 Check Display Cable Connections

Follow these steps to check the display cable connections:

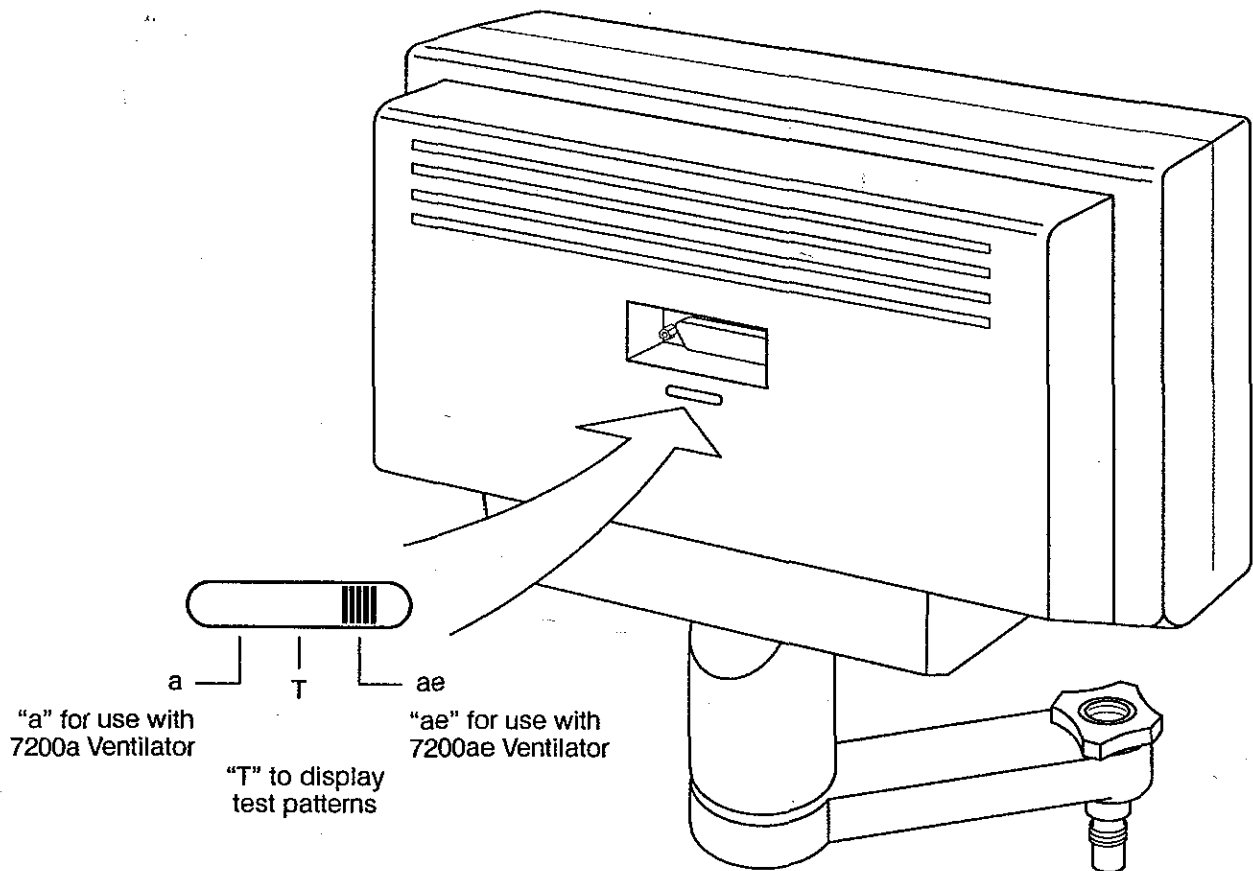
1. Verify that the display cable is connected properly to the DISPLAY port on the back of the ventilator. (Turn off the ventilator before connecting the cable if the display cable is not connected.) For displays with rear switch only: Ensure that the display cable is connected properly to the back of the display.
2. Open the display and verify that the display cable is connected properly to connectors J1, J4, J6, and J7 on the PCB assembly. For displays with rear switch only: Also ensure that the internal harness is connected to the E1-E8 jumper block, and to the rear panel of the display. Section 2 tells you how to open the display and shows the correct connections.
3. Use a digital multimeter to check the cable fuses.

3.1.5 Check the Test Screens

Follow these steps to check the test screens:

1. Turn the ventilator off.
2. For displays with rear switch only: Set the switch at the back of the display in the "T" position (see Figure 3-3).

For display with no external switch only: Open the display and move the jumper on the controller PCB from position E3 to position E7 (see Figure 3-4).



E20547-001C

Figure 3-3. Setting the Display Switch (For Displays with Rear Switch Only)

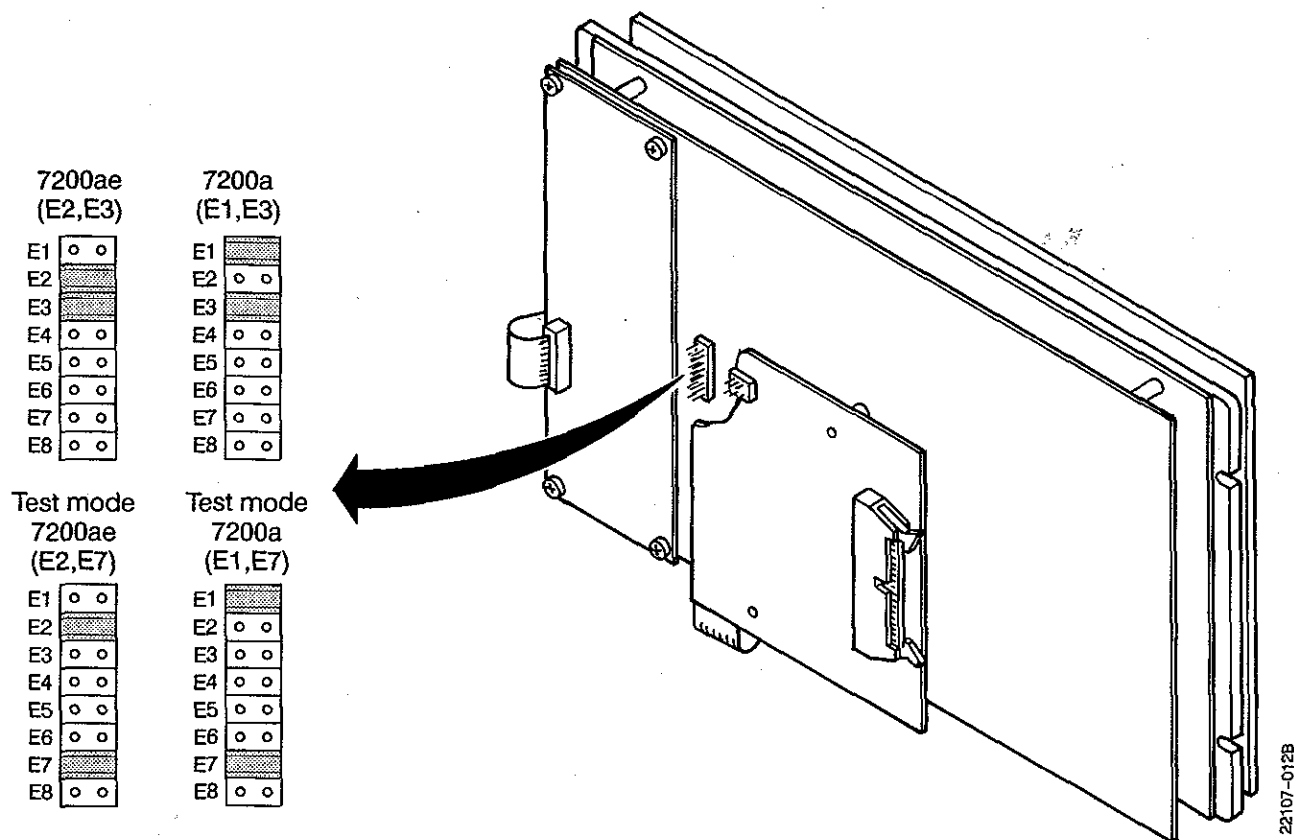


Figure 3-4. Moving the 7202 Controller PCB Jumper from E3 to E7 (Display with no External Switch Only)

3. Make sure that the brown cable connector is attached to J1 on the controller PCB, and the display cable is attached to the DISPLAY port on the back of the ventilator.
4. Turn the ventilator on. The test patterns should appear on the display screen. (The test patterns include: normal-intensity filled-in screen, screen off, vertical lines "walking" across the screen, reverse-video vertical lines "walking" across the screen, lower-intensity filled-in screen.) The test patterns will be displayed continuously until the ventilator is turned off.
5. If any part of any test screen is missing: Recheck all cable connections (ribbon cables, interconnect cable, and display cable, as described in Section 2). If this does not resolve the problem, continue with this procedure.
6. Turn off the ventilator. Replace the switch to the "a" or "ae" position (for displays with rear switch), or the jumper to position E3 (for displays with no external switch).

3.1.6 Check Display Power Supply Voltages

This section tells you how to check the power supply voltages inside the display. Section 2 gives a detailed description of how to disassemble the display.

WARNING

Do not disassemble the display while the ventilator is operating. When checking power sources with the ventilator turned on, be careful to avoid electrical shock. Follow the accepted safety procedures for electrical equipment when testing, making connections and adjustments, or repairs.

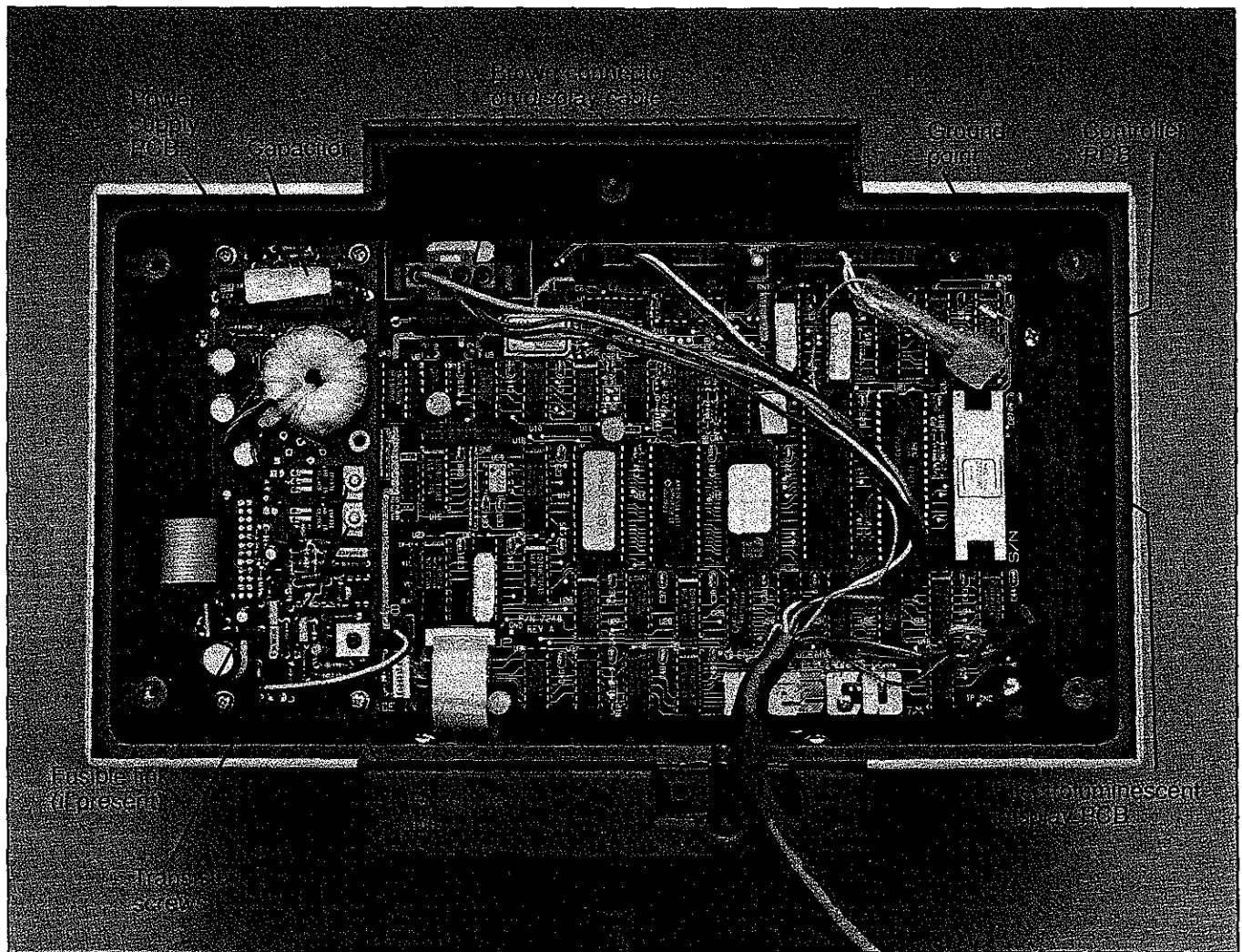
There are two versions of the power supply PCB: Figure 3-5 shows the early version, and Figure 3-6 shows the current version. Identify the version of power supply PCB before checking voltages. Follow these steps:

1. Remove the rear housing of the display (see Section 2).
2. Disconnect the cable from the connectors on the PCB assembly (see Section 2).

CAUTION

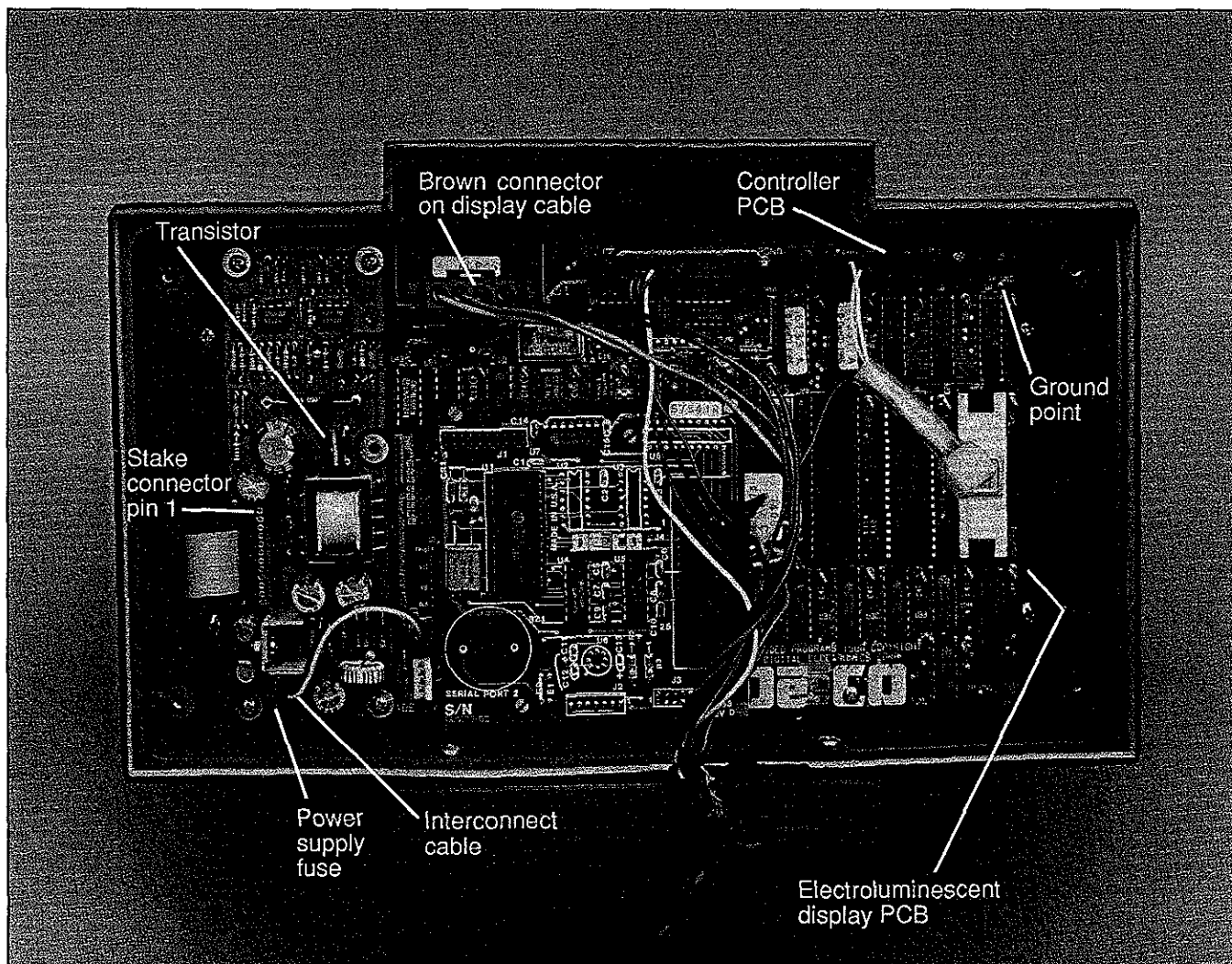
When handling PCBs, do not touch PCB connector ends. Acids on fingers can cause corrosion and subsequent equipment malfunction. When removing any of the PCBs, use a properly grounded mat and wrist strap.

3. Take the PCB assembly out of the front housing and set it down on an antistatic mat.
4. Attach the brown cable connector (the power line) to J1 on the controller PCB. Connect the ventilator to a power source and turn it on.



88-0368-BW67-0001

Figure 3-5. 7202 Display Voltage Test Points (Early Version of Power Supply PCB)



90-00002-BW67-0001

Figure 3-6. 7202 Display Voltage Test Points (Current Version of Power Supply PCB)

5. Perform the complete voltage test in the sequence shown in Table 3-1 to ensure proper fault isolation. Table 3-1 summarizes the correct voltages and the appropriate corrective actions.

CAUTION

The bottom wire of the fusible link (if present on the power supply PCB) is hard to reach. To avoid blowing the fusible link, touch the lead to the lower test point very carefully. Figure 3-7 shows you how to test across the fusible link.

WARNING

To prevent electric shock, use proper precautions while testing, and avoid touching the test points yourself. The voltages across the capacitor (early version of power supply PCB) or between ground and stake connector pin 1 (current version power supply PCB) are high (230 V dc). Figure 3-8 shows you how to test across the capacitor.

Table 3-1. Test Voltages

Test Point (Early Version Power Supply PCB)	Test Point (Current Version Power Supply PCB)	Correct Voltage	Corrective Action (if voltage is not present)
Brown connector on display cable. Negative: brown wire. Positive: red wire.	Brown connector on display cable. Negative: brown wire. Positive: red wire.	4.75–5.25 V	<i>Display with rear switch:</i> Replace the internal display cable; if the problem is not resolved, replace the external display cable. <i>Display with no external switch:</i> Replace the display cable.
Brown connector on display cable. Negative: orange wire. Positive: yellow wire. (Reattach connector to J1 on controller PCB.)	Brown connector on display cable. Negative: orange wire. Positive: yellow wire. (Reattach connector to J1 on controller PCB.)	11.4–12.6 V	<i>Display with rear switch:</i> Replace the internal display cable; if the problem is not resolved, replace the external display cable. <i>Display with no external switch:</i> Replace the display cable.
Interconnect cable at power supply PCB. Negative and positive: one at each socket.	Interconnect cable at power supply PCB. Negative and positive: one at each socket.	11.4–12.6 V	Replace the controller PCB.
Fusible link (if present). Negative: GND. Positive: top wire. (See Figure 3-7.)	Power supply fuse. Negative: GND. Positive: top wire.	11.4–12.6 V	Replace electroluminescent PCB (which also includes power supply PCB).
Fusible link (if present). Negative: GND. Positive: bottom wire. (See Figure 3-7.)	Power supply fuse. Negative: GND. Positive: bottom wire.	11.4–12.6 V	Verify voltage from interconnect cable. If that voltage is correct, replace electroluminescent PCB.
Transistor screws. Negative: GND. Positive: across tops of screws.	Power supply fuse. Negative: GND. Positive: top of transistor.	11.4–12.6 V	Verify interconnect cable voltage. If that voltage is correct, replace electroluminescent PCB.
Capacitor. Negative: inside wire. Positive: outside wire. (See Figure 3-8.)	Stake connector. Negative: GND. Positive: stake connector pin 1.	199–242 V	Verify correct voltages at fusible link and transistor screws or power supply fuse and transistor. If those voltages are correct, replace the electroluminescent PCB.

NOTE

The electroluminescent PCB and the power supply PCB are a matched set. The controller and piggyback PCBs are also a matched set. If you replace one board in a set, replace both boards with another matched set to ensure proper display operation. (You cannot order one board separately.)

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the flat toroids from the old ribbon cables and reinstall them on the new ribbon cables. Slip a flat toroid over each ribbon cable, and attach adhesive tape (P/N 4-004975-00) to the top of each toroid. Adhere the two toroids to the underside of the controller PCB.

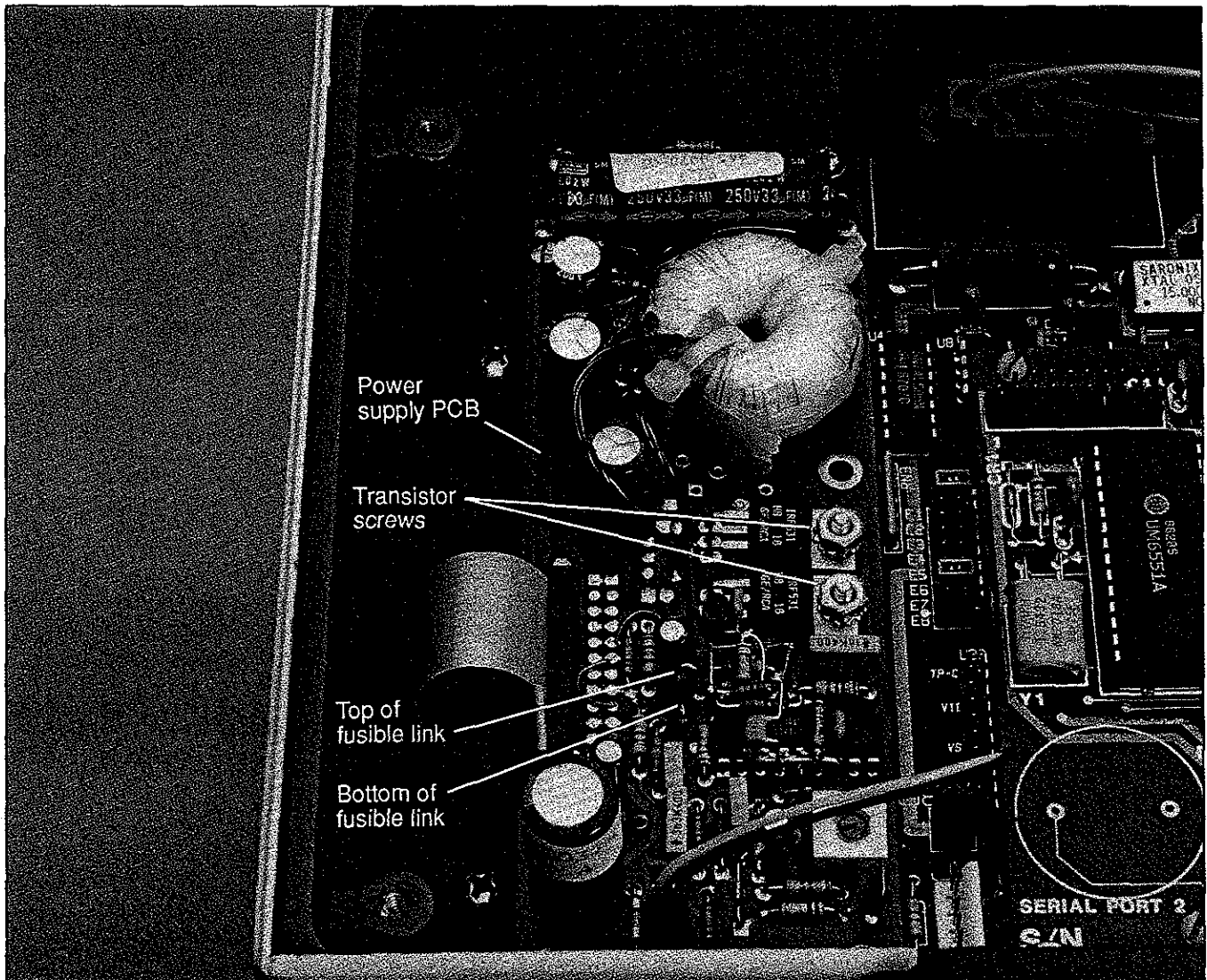


Figure 3-7. Fusible Link and Transistor Screws (Early Version of Power Supply PCB)

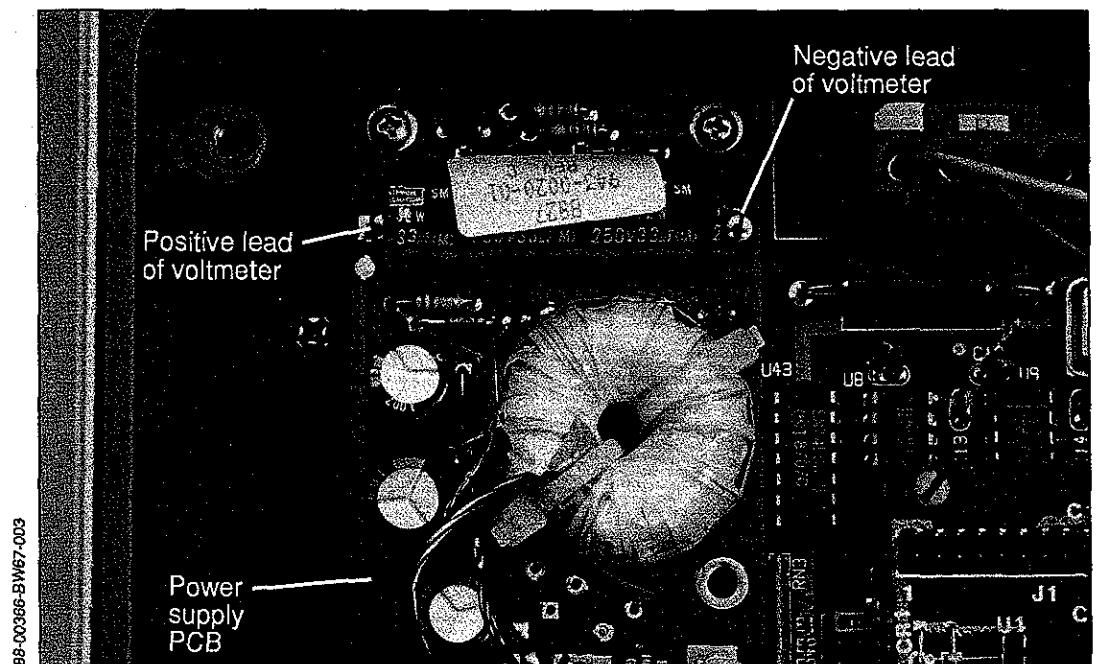


Figure 3-8. Testing Across the Capacitor (Early Version of Power Supply PCB)

If the display still does not work once you have taken corrective actions, recheck the voltages. If the voltages are still not correct, the display may not be getting power from the ventilator. Refer to the *7200 Series Ventilatory System Service Manual* for instructions on testing ventilator power sources.

3.1.7 Check PCB Assembly Cabling

Open the unit and verify that the ribbon cables and the interconnect cable are properly connected between the electroluminescent PCB, controller PCB, and power supply PCB. Even if the ribbon cables appear secure, remove and resecure them. Check that the conductive fingers on the ribbon cables are facing in the proper direction.

Section 2 tells you how to open the unit and shows the correct connections.

3.1.8 If the Display Still Doesn't Work

If, after you have followed all of the procedures in this section, you still cannot resolve the problem, follow these steps:

1. Replace the electroluminescent PCB assembly (this field-replaceable unit includes both the electroluminescent and the power supply PCBs).

NOTE

The electroluminescent PCB and the power supply PCB are a matched set. The controller and piggyback PCBs are also a matched set. If you must replace one board in a set, replace both boards with another matched set to ensure proper display operation. (You cannot order one board separately.)

If you replace the electroluminescent or power supply PCBs, be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.

If this does not resolve the problem, go to the next step.

2. Replace the controller PCB assembly (this field-replaceable unit includes both the controller PCB and the piggyback PCB).

NOTE

If you replace the controller or piggyback PCBs, be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

3.2

Ventilator Does not Communicate with Display, but Works Properly with Another Display or Printer

Follow these steps:

1. For displays with rear switch only: Set the switch at the back of the display in the correct position (see Figure 3-3).

For displays with no external switch only: Open the display and check that the jumpers on the controller PCB are set properly (see Figure 3-4).

2. Check the connections at the PCB assembly connectors and the ventilator DISPLAY port. For the display with the rear switch, also check that the display cable and internal harness are properly connected to the rear housing.

Section 2 tells you how to open the unit, and shows the correct cable connections. Ensure that all pins are properly inserted in the connector shell.

3. If the cable is properly connected but there is no communication with the original display, replace the display cable.
4. If there still is no communication, replace the electroluminescent PCB assembly (this assembly also includes the power supply PCB).

NOTE

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.

5. If the problem persists, replace the controller PCB assembly (this field-replaceable unit includes both the controller and piggyback PCBs).

NOTE

If you replace the controller or piggyback PCBs, be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

6. If the ventilator still doesn't communicate with the display, follow the troubleshooting steps in Section 3.1.

3.3

Display Works but Printer Doesn't

Follow these steps:

1. Verify that the printer is supplied with paper and a cartridge. Verify that the printer is plugged in, turned on, and on-line.
2. Verify that the printer cable is properly connected to the PRINTER port on the ventilator back panel.
3. Verify that the switches on the ventilator's memory PCB (7200a) or DCI/display controller PCB (7200ae) are set correctly. Figures 3-1 and 3-2 show the proper switch settings.
4. Use the printer self test to check that the printer is working properly: Press down and hold the line feed button, then turn on the printer while holding down the line feed button.

Release the line feed button. The printer should start the self-test pattern shown in Figure 3-9.

If the printer doesn't run the self-test, there is a printer malfunction. Check the logo on the front of the printer. If the Puritan-Bennett logo appears, call Puritan-Bennett for servicing. If another logo appears, call the printer's manufacturer for servicing.

!#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~■!#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~■

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! "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO  
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+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]  
^_`abcdefghijklmnopqrstuvwxyz{|}~!"#$%&'()*+,-./0123456789:  
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
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`(>)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
(>)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
>*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
>*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
+,*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
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-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
-./0123456789:;<=>?@ABCDEFGHIJKLMNopQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz

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89: ; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ `
9: ; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ `
: ; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` a
<=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` ab
^=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` abc
=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` abcd
>?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` abcde
?@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` abcdef
@ABCDEFGHIJKLMN O PQRSTU VWXYZ[\ ] ^ _ ` abcdefg

```

22107-0015A

5. Verify that the display cable is connected properly to the DISPLAY port on the ventilator back panel.
6. For 7200a Ventilators only: Bypass the display by installing a jumper plug (P/N 4-018143-00) into the DISPLAY port. Go to the next step if the printer works.
7. Verify that the display cable is connected properly to the PCB assembly connectors. Section 2 tells you how to open the unit, and shows the correct cable connections. Ensure that all pins are properly inserted in the connector shell.
8. If the problem persists, replace the electroluminescent PCB assembly (this assembly also includes the power supply PCB).

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.

9. If the procedures in the previous steps have not corrected the problem, replace the controller PCB assembly (this field-replaceable unit includes both the controller and piggyback PCBs).

NOTE

If you replace the controller or piggyback PCBs, be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

If the display is not available, install the jumper plug (P/N 4-018143-00) into the DISPLAY port. The jumper plug must be installed for the printer to operate when the display is disconnected from a 7200a Ventilator. (The jumper plug is not required for the 7200ae Ventilator.)

3.4 Display Shows All Data on One Line

Follow these steps:

1. Verify that the display cable is connected properly to the PCB assembly connectors. Section 2 tells you how to open the unit, and shows the correct cable connections. Ensure that all pins are properly inserted in the connector shell.
2. Verify that the rear switch is set correctly (for displays with the rear switch, see Figure 3-3), or that the jumpers on the controller PCB are set correctly (for displays with no external switch, see Figure 3-4).
3. Verify that the screen template EPROM (shown in Figure 3-10) is seated properly in its socket (U17).

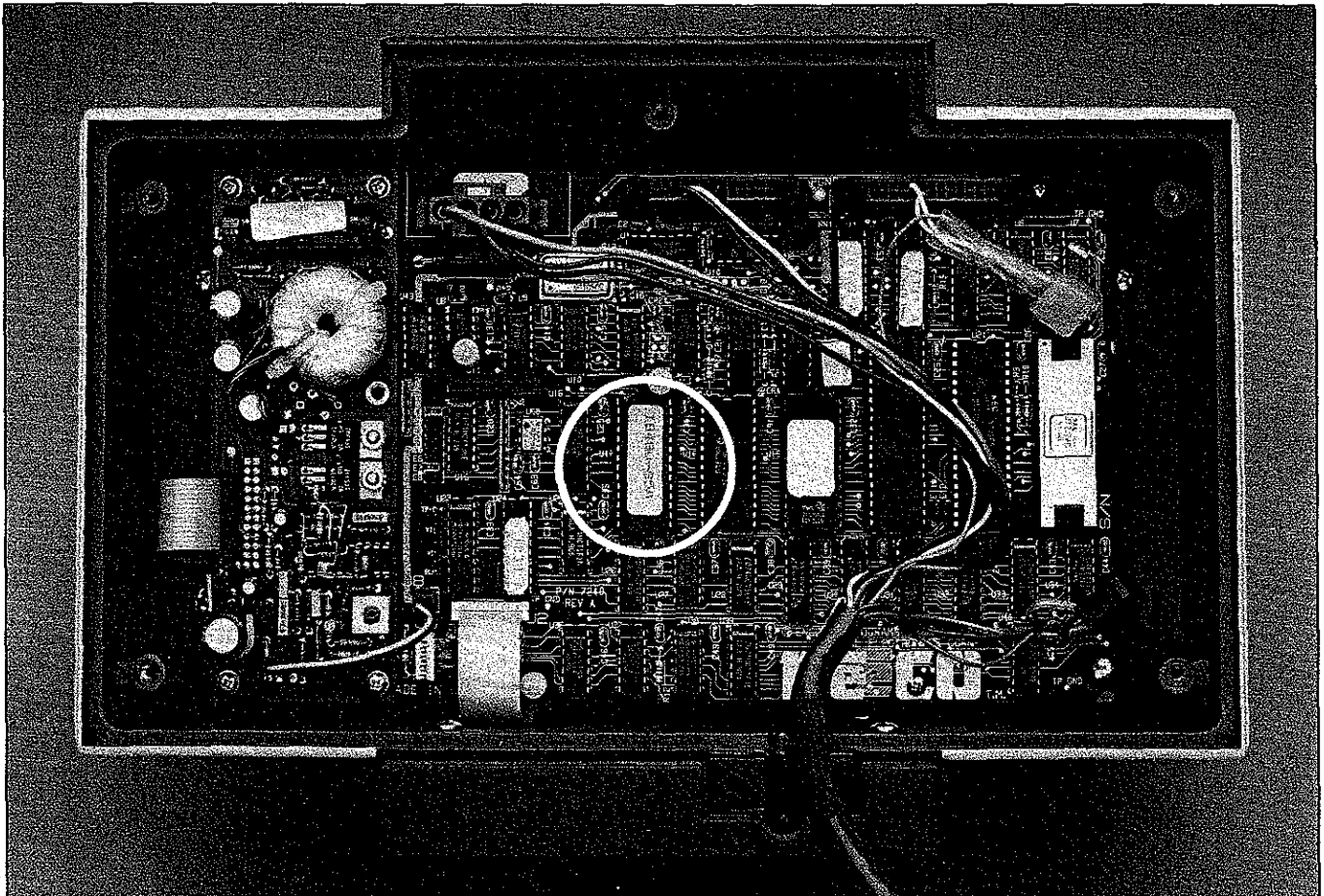


Figure 3-10. Screen Template EPROM (U17)

88-00366-BW67-001

4. If the EPROM is seated properly but the problem remains, replace the EPROM.
5. If the above steps do not resolve the problem, replace the electroluminescent PCB assembly (this assembly also includes the power supply PCB).

NOTE

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.

6. If the problem remains, replace the controller PCB assembly (this field-replaceable unit includes both the controller and piggyback PCBs).

NOTE

If you replace the controller or piggyback PCBs, be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

3.5 Screen Display Otherwise Flawed

Follow these steps if the screen shows "snow," missing segments, bright or dim lines or spots, "ghost" images, or fluctuating displays:

1. Verify that the display cable is connected properly to the PCB assembly connectors. Section 2 tells you how to open the unit, and shows the correct cable connections. Ensure that all pins are properly inserted in the connector shell.
2. Verify that the ribbon cables and the interconnect cable are properly connected to between the electroluminescent PCB, controller PCB, and power supply PCB (Section 2 shows the correct connections). Even if the ribbon cables appear secure, remove and resecure them. Check that conductive fingers on ribbon cables are facing in the proper direction.
3. Replace the electroluminescent PCB assembly (this field-replaceable unit includes both the electroluminescent and the power supply PCBs).

NOTE

The electroluminescent PCB and the power supply PCB are a matched set. The controller and piggyback PCBs are also a matched set. If you must replace one board in a set, replace both boards with another matched set to ensure proper display operation. (You cannot order one board separately.)

If you replace the electroluminescent or power supply PCBs (the two PCBs are a matched set), be sure to remove the old ribbon cables from the flat toroids attached to the underside of the controller PCB.

4. Replace the controller PCB assembly (this field-replaceable unit includes both the controller and piggyback PCBs).

NOTE

If you replace the controller or piggyback PCBs, be sure to remove the flat toroids from the underside of the old controller PCB, and reinstall the toroids on the new controller PCB. Use adhesive tape (P/N 4-004975-00) to attach the toroids to the underside of the controller PCB.

3.6 Cursor Appears but Ventilator Cannot Communicate with Display

Follow these steps:

1. Check the test screens as described in Section 3.1.5.
2. Verify that the rear switch is set correctly (for displays with the rear switch, see Figure 3-3), or that the jumpers on the controller PCB are set correctly (for displays with no external switch, see Figure 3-4).
3. If the screen test works properly, verify that the display cable is connected properly to the PCB assembly connectors. Section 2 tells you how to open the unit, and shows the correct cable connections. Ensure that all pins are properly inserted in the connector shell.

3.7 Screen is Delaminating

Replace the front housing.

3.8 Performance Testing

Performance testing for the display consists of checking the test screens every six months. Follow these steps to check the test screens:

1. Turn the ventilator off.
2. For displays with rear switch only: Set the switch at the back of the display in the "T" position (see Figure 3-3).
For displays with no external switch only: Open the display and move the jumper on the controller PCB from position E3 to position E7 (see Figure 3-4).
3. If they are not already attached, plug the brown cable connector to J1 on the controller PCB, and the display cable to the DISPLAY port on the back of the ventilator.
4. Turn the ventilator on. The test patterns should appear on the display screen. (The test patterns include: normal-intensity filled-in screen, screen off, vertical lines "walking" across the screen, reverse-video vertical lines "walking" across the screen, lower-intensity filled-in screen.) The test patterns will be displayed continuously until the ventilator is turned off.
5. If any part of any test screen is missing: Recheck all cable connections (ribbon cables, interconnect cable, and display cable, as described in Section 2). If this does not resolve the problem, continue with this procedure.
6. Turn off the ventilator. Replace the switch to the "a" or "ae" position (displays with rear switch), or the jumper to position E3 (displays with no external switch).

SECTION 4. PARTS LIST

This section lists the parts that can be ordered from Puritan-Bennett for servicing the 7202 Display. This section includes the following assemblies: 7202 Display, PCB assembly, and swivel arm assembly. This section also includes the kits associated with the 7202 Display.

After consulting this parts list, if you are still unsure of the correct part to order, or if you need additional technical information, call 1-800-255-6774 (in the USA and Canada). Outside the USA and Canada, contact your local Puritan-Bennett Corporation representative.

Table 4-1. 7202 Display Parts List (Rear Switch)

Item Number	Part Number	Description
(Figure 4-1)	4-018470-00	7202 Display (English)
	4-018471-00	7202 Display (Spanish)
	4-018472-00	7202 Display (Italian)
	4-018473-00	7202 Display (French)
	4-018474-00	7202 Display (German)
1	4-018252-00	Assembly, front housing
2	4-018251-00	Assembly, rear housing (includes gasket, item 14)
3	4-006285-00	Screw, pan head, 8-32 x 1 5/8, stainless steel
4	4-006666-00	Washer, flat, #8, stainless steel
5	--	PCB assembly (Figure 4-3)
6	4-018299-00	Swivel arm assembly (Figure 4-4)
7	4-006504-00	Screw, pan head, 8-32 by 7/16, zinc-plated
8	4-007299-00	Lockwasher, #8, stainless steel
9	4-017128-00	Cable, display, internal (includes items 15-20)
10	4-017129-00	Cable, display, external
11	4-018254-00	Spring assembly
12	4-018776-00	Bracket
13	4-018775-00	Bottom plate
14	4-040314-00	Gasket, 0.04 D, silicone rubber
15	4-018777-00	Connector plate
16	4-019152-00	Screw lock assembly, female
17	4-008373-00	Nut, hex, 2-56, stainless steel
18	4-008374-00	Lockwasher, #2, stainless steel
19	4-008372-00	Screw, flat head, 2-56 x 1/4, stainless steel
20	4-025123-00	Fuse, 2A, ceramic

Table 4-2. 7202 Display (No External Switch)

Item Number	Part Number	Description
(Figure 4-2)	--	7202 Display (English) 7202 Display (Spanish) 7202 Display (Italian) 7202 Display (French) 7202 Display (German) (To order a complete new display, order display with rear switch. See Table 4-1.)
1	--	Assembly, front housing (Not stocked as a separate replacement part. Order an Upgrade Kit P/N 4-018353-00.)
2	4-018184-00	Assembly, rear housing
3	4-009423-00	Screw, pan head, 6-32 by 7/8, zinc-plated
4	--	PCB assembly (Figure 4-3)
5	4-000143-00	Screw, pan head, 8-32 by 1/2, zinc-plated
6	4-018299-00	Swivel arm assembly (Figure 4-4)
7	4-002671-00	Screw, pan head, 8-32 by 1 1/4, zinc-plated
8	4-018438-00	Handle
9	4-025121-00	Cable, display
10	4-018298-00	Spring assembly
11	4-025123-00	Fuse, 2A, ceramic

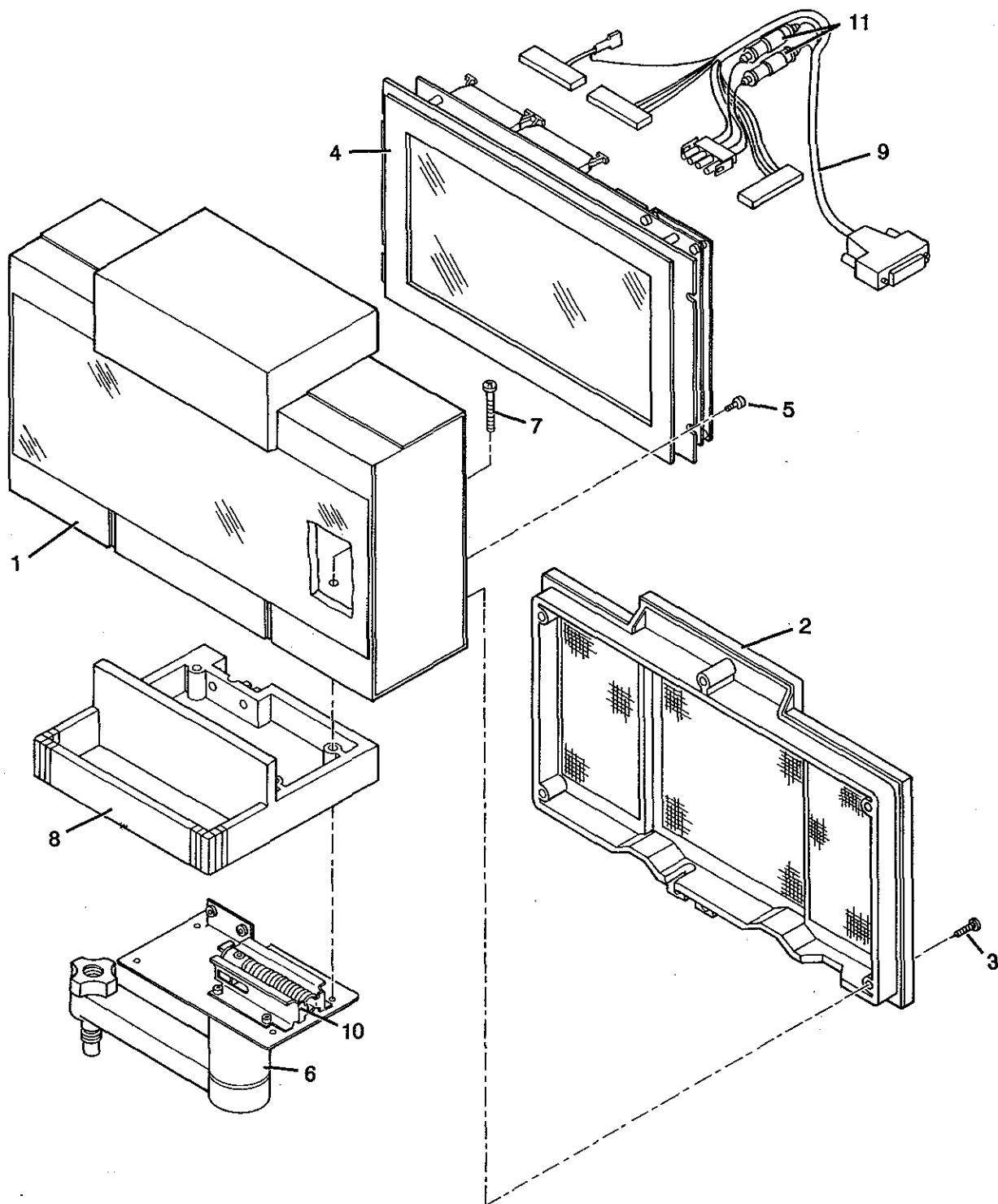
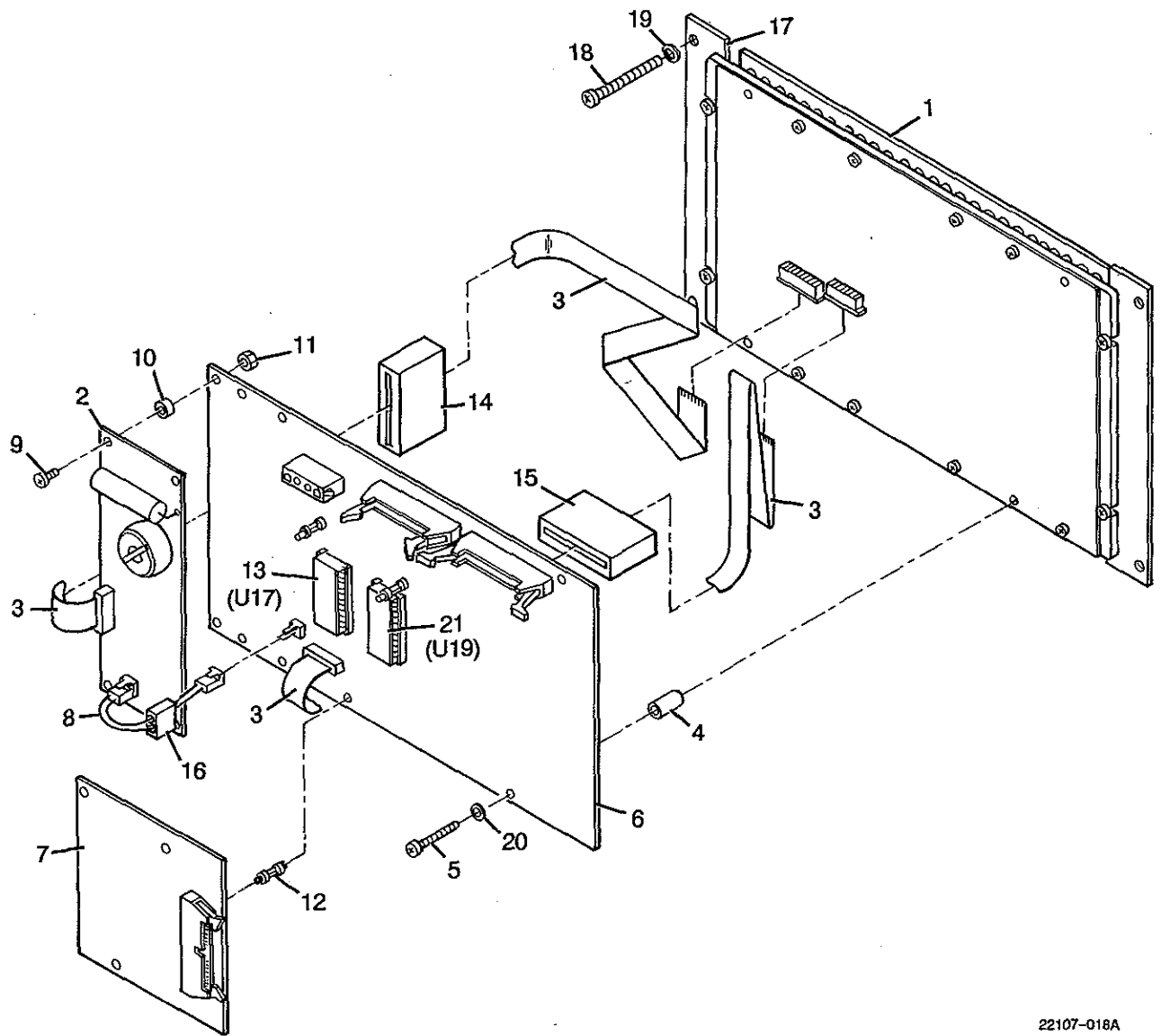


Figure 4-2. 7202 Display (No External Switch)

22107-017A

Table 4-3. PCB Assembly Parts List

Item Number	Part Number	Description
(Figure 4-3)	--	PCB assembly
1	4-018420-00	PCB, electroluminescent
	4-018196-00	PCB, electroluminescent (exchange)
2	--	PCB, power supply (Not stocked as a separate replacement part. Order an electroluminescent PCB, item 1.)
3	--	Cables, ribbon (Not stocked as separate replacement parts. Order an electroluminescent PCB, item 1.)
4	4-006287-00	Spacer, round, 1/4 D, 0.140 ID, 1 L (rear switch)
	4-009693-00	Spacer, round, 1/4 D, 0.140 ID, 1/2 L (no external switch)
5	4-007035-00	Screw, pan head, 4-40 by 1.5, zinc-plated (rear switch)
	4-009891-00	Screw, pan head, 4-40 by 1, zinc-plated (no external switch)
6	4-018421-00	PCB, controller
	4-018197-00	PCB, controller (exchange)
7	--	PCB, piggyback (Not stocked as a separate replacement part. Order a controller PCB, item 6.)
8	--	Cable, interconnect (Not stocked as a separate replacement part. Order a controller PCB, item 6.)
9	4-009877-00	Screw, pan head, 4-40 by 3/8, zinc-plated
10	4-006299-00	Spacer, round, 1/4 D, 0.115 ID, 1/8 L
11	4-000780-00	Nut, machine screw, 4-40, zinc-plated
12	4-018154-00	Standoff, locking, 6/6, nylon
13	4-018480-00	EPROM, screen template (English) (U17)
	4-018481-00	EPROM, screen template (Spanish) (U17)
	4-018482-00	EPROM, screen template (Italian) (U17)
	4-018483-00	EPROM, screen template (French) (U17)
	4-018484-00	EPROM, screen template (German) (U17)
14	4-025116-00	Toroid, flat (Use double-sided tape P/N 4-004975-00, to fasten to underside of controller PCB.)
15	4-025116-00	Toroid, flat (Use double-sided tape P/N 4-004975-00 to fasten to underside of controller PCB.)
16	4-025117-00	Toroid, cable shield
17	4-018776-00	Bracket (rear switch version only)
18	4-002907-00	Screw, pan head, 6-32 x 3/8, stainless steel (rear switch version only)
19	4-007943-00	Lockwasher, #6, stainless steel (rear switch version only)
20	4-008107-00	Lockwasher, #4, stainless steel (rear switch version only)
21	4-018478-03	EPROM, main software (all languages) (U19)



22107-018A

Figure 4-3. PCB Assembly